2018 Annual Groundwater Monitoring and Corrective Action Report

Laramie River Station
Wheatland, Wyoming

Basin Electric Power Cooperative

Project number: 60577052

January 31, 2019

Basin Electric Power Cooperative
Bismarck, North Dakota

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List of Acronyms

ASD	Alternative Source Demonstration
bgs	below ground surface
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
FGD	Flue Gas Desulfurization
ft	feet
ft/d	feet per day
GWPS	groundwater protection standard
LRS	Laramie River Station
MCL	maximum contaminant level
MW	megawatt
RCRA	Resource Conservation and Recovery Act
SSI	statistically significant increase
SSL	statistically significant level
TDS	total dissolved solids
UPL	upper prediction limit
USGS	U.S. Geological Survey
95LCL	95 percent lower confidence limit

1. Introduction

On behalf of Basin Electric Power Cooperative, (Basin), AECOM prepared the 2018 annual report documenting groundwater monitoring and corrective action for the Coal Combustion Residuals (CCR) units at Basin's Laramie River Station (LRS).

Chapter 1.0 provides background information on the power generating facility, the CCR unit(s) present at LRS, and the physical setting of the CCR unit(s), specifically with regard to groundwater conditions. Chapter 2.0 summarizes CCR groundwater monitoring activities conducted prior to 2018. Chapter 3.0 summarizes the groundwater monitoring and corrective action activities completed in 2018, and references attachments to this report that contain detailed documentation of those activities. Chapter 4.0 provides some general information regarding the LRS CCR program and actions planned for 2019. Chapter 5.0 presents a summary and conclusions from CCR groundwater monitoring in 2018 and statistical analysis of the results. Chapter 6.0 lists references cited in this report.

Regulatory Background

The CCR rule (Chapter 40 of the Code of Federal Regulations (CFR) Part 257 Subpart D) became effective on October 19, 2015 and established standards for the disposal of CCR in landfills and surface impoundments (CCR units). In particular, the rule set forth groundwater monitoring and corrective action requirements for CCR units. The rule includes the requirement for an "annual groundwater monitoring and corrective action report" (annual report), with the annual report for 2018 due by January 31, 2018. The annual report is intended to document the status of the groundwater monitoring and corrective action program for each CCR unit, summarize key actions completed in the previous year, and project key activities for the upcoming year. This report is the second annual report for LRS, and includes activities performed in calendar year 2018.

Facility Location and Operational History

LRS, located east of Wheatland, Wyoming (**Figure 1-1**), is one of the largest consumer-operated, regional, joint power supply ventures in the United States. LRS is a coal-based generating station located in Platte County east of Wheatland, Wyoming. The plant consists of three power generating units with a total power output capacity of 1,710 megawatts (MW):

- Unit 1, with a rating of 570 MW, which began operating in 1980;
- Unit 2, with a rating of 570 net MW, which began operating in 1981; and
- Unit 3, with a rating of 570 net MW, which began operating in 1982.

CCR produced at LRS includes fly ash, bottom ash, and flue gas desulfurization (FGD) waste.

CCR Unit Description

Coal ash is disposed at LRS in the following CCR units/multi-units:

- Bottom Ash Pond 1
- Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill (multi-unit)
- Emergency Storage Ponds (multi-unit)

The ash landfill and three ash ponds are located west of the generating units and office complex, near the western edge of the site (**Figure 1-2**). The two emergency holding ponds are located north of the generating units in the northeastern part of the site. The landfill and ash ponds were permitted in 1978 and began receiving coal ash in 1980. The emergency holding ponds were subsequently incorporated due to disposal of FGD materials. Basin reported that in 2018 the landfill received approximately 335,000 tons of solid waste, including fly ash, FGD waste, and a minor contribution of solid debris. The landfill is currently accessed via a haul road running generally east to west along the south side of the landfill.

Physical Setting

The geological and hydrogeological setting is important to understanding the groundwater environment in the vicinity of the LRS. The geologic history of Platte County is similar to most areas within the Front Range of the Rocky Mountains. Platte County is underlain by marine and continental deposits of limestone, conglomerate, sandstone, siltstone, shale, and unconsolidated sediments. Deposits range in thickness over the Laramie Range, Hartville uplift, and related features up to 10,000 feet in the east central and southeastern parts of the county. Precambrian rocks generally make up the mountainous (structurally complex) areas, Paleozoic and Mesozoic rocks adjoin the older formations, and Tertiary and Quaternary rocks underlie most of the county east of the Laramie Range (U.S. Geological Survey [USGS] 1960). The Laramide Orogeny was active in the county approximately 70 million years ago marking the beginning the Hartville uplift and Laramie Range. In the Cenozoic, streams eroded the eastern side of the range depositing silts, sands, and gravels of the Brule and Arikaree Formations that underlie the Wheatland area and subsequently Basin Electric LRS.

Precipitation landing on the eastern flank of the Laramie Range supplies surface water to perennial and ephemeral streams that flow east towards the basin. Most surface water west of Wheatland eventually joins with the Laramie River continuing east before discharging into the Platte River near Fort Laramie. Groundwater near Wheatland is recharged primarily through infiltration on the eastern flank of the Laramie Range, and through re-infiltration of irrigation water during the spring, summer, and fall months. Some groundwater in the saturated zones eventually returns to the land surface through seeps and springs, or is discharged by wells and evapotranspiration; however, the majority flows into surface streams. Alluvial drainages bounding the eastern (Wheatland Creek) and western portions (Chugwater Creek) of the facility transport surface water generally northward, discharging to the Laramie River (USGS 1960). Some groundwater within these regions percolates into the Arikaree Formation which holds the uppermost aquifer beneath the LRS facility.

The LRS facility is underlain by a 5- to 30-foot (ft) thick section of Quaternary sediments that overlies the Arikaree Formation. The Arikaree Formation is comprised primarily of loosely to moderately cemented very fine to fine grained sandstone containing interbeds of silts and clays. A lower unit consists of lenses of loosely to well-cemented red to gray coarse sandstone interbedded with lenses of well-cemented conglomerate. A basal conglomerate lies unconformably upon the underlying Brule Formation in many places throughout Platte County (USGS 1960). A review of the geologic logs generated during the drilling of the onsite water supply well (Forell-Baumgardner No. 2) suggests the Brule Formation is approximately 820 ft below ground surface (bgs) in the western portions of the site. Based on this information, the local thickness of the Arikaree Formation onsite is approximately 790 ft thick.

The lithologic characteristics of the Arikaree Formation beneath the LRS are generally consistent, although there are slight differences in the degree of cementation and induration, and minor variations in grain size. Few fractures were noted in borehole soil cores obtained during monitoring well network installation. Interbeds with higher silt and clay content, coupled with greater cementation generate thin discontinuous perched groundwater horizons that are interpreted to hold only seasonal groundwater. The perched groundwater would tend to percolate downward to what is interpreted as the uppermost aquifer based on data obtained during monitoring well installation and aquifer testing. The uppermost aquifer is present at a depth of approximately 95 ft bgs in the southeastern portion of the LRS facility, and slopes generally north towards the Laramie River. The hydraulic gradient for the uppermost aquifer beneath the site appears to be controlled dominantly through topographic features and enhanced infiltration zones in permeable shallow alluvium. A representative potentiometric surface map from one of the Assessment Monitoring events conducted in 2018 is presented in **Figure 1-2**. Aquifer pump testing was completed at eight groundwater monitoring wells. The resulting data were used to estimate hydraulic conductivities ranging from 0.65 feet per day (ft/d) to 3.12 ft/d, with an average of 1.40 ft/d. Aquifer slug tests were performed on eight other wells, with resulting estimated hydraulic conductivities ranging from 0.45 ft/d to 6.28 ft/d, with an average of 2.16 ft/d.

2. CCR Groundwater Monitoring Activities Prior to 2018

The regulatory process for CCR groundwater monitoring and corrective action is established by 40 CFR §§ 257.90 through 257.98. The process includes a phased approach to groundwater monitoring, leading (if applicable) to the establishment of groundwater protection standards (GWPSs) for each CCR unit. Exceedances of the GWPSs that are determined to be statistically significant can trigger requirements for additional groundwater characterization and corrective action assessment followed by corrective action implementation. The following paragraphs provide a brief summary of CCR groundwater monitoring activities performed prior to 2018. CCR groundwater monitoring activities performed in 2018 are discussed in Chapter 3.

Groundwater monitoring at LRS is performed using a network of monitoring wells that includes both wells to monitor background water quality that is not potentially influenced by the presence of the CCR unit, and wells placed at the downgradient boundary of the unit (**Figure 2-1**). The hydrostratigraphic positions of the CCR monitoring wells selected for sampling background and downgradient groundwater quality for each LRS CCR unit or multi-unit is summarized below:

CCR unit/multi-unit	Background wells	Downgradient wells
Bottom Ash Pond 1	MW-52B, MW-53B	MW-49B, MW-21B, MW-38B
Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill	MW-39B, MW-32B	MW-36B, MW-37B, MW-20B, MW-14BR, MW-40B, MW-52B, MW-53B
Emergency Holding Ponds	MW-41B, MW-42B, MW-43B	MW-44B, MW-45B, MW-46B, MW-47B

The following eight monitoring wells are also included in the CCR monitoring system for the purpose of measuring groundwater elevations and evaluating groundwater flow direction and velocity in the vicinity of the bottom ash ponds and landfill:

- MW-22B, MW-23B, MW-33B, MW-34B, MW-35B, MW-48B, MW-50B, MW-51B.

Detection Monitoring was initiated in August 2016, which involved sampling groundwater for Part 257 Appendix III and IV constituents over eight Baseline Detection Monitoring events.

Baseline Detection Monitoring events were performed in general accordance with procedures established in the site-specific Sampling and Analysis Plan (AECOM 2018a), which is included in the facility's Operating Record. The Sampling and Analysis Plan describes the procedures for equipment calibration, monitoring well water level measurement, monitoring well purging and sampling, sample custody, sample shipping, laboratory analysis and documentation requirements for each groundwater sample submitted. The results of detection monitoring at LRS were presented and discussed in the First Annual Groundwater Monitoring and Corrective Action Report, 2016-2017 (AECOM 2018b).

If a statistically significant increase (SSI) of any Appendix III constituent relative to background conditions is detected in the downgradient monitoring wells, and cannot be demonstrated to be associated with a source other than the CCR unit, then the CCR rule requires that groundwater monitoring transition from the Detection Monitoring phase to the Assessment Monitoring phase.

The results of Detection Monitoring for the CCR unit and multi-units at LRS identified SSIs relative to background for the following Appendix III constituents:

- Bottom Ash Pond 1 – SSIs for boron, calcium, chloride, sulfate and total dissolved solids (TDS)
- Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill – SSIs for fluoride and chloride
- Emergency Holding Ponds – SSI for fluoride.

As a consequence, all three LRS groundwater monitoring systems were transitioned from Detection Monitoring to Assessment Monitoring in 2018. Notice of this transition, dated February 15, 2018, was posted to Basin's publicly accessible CCR website as required by § 257.107(h)(4).

3. CCR Groundwater Monitoring and Corrective Action Activities in 2018

This chapter summarizes the activities conducted at LRS in 2018 to comply with the groundwater requirements of the CCR rule:

- Alternative Source Demonstration (ASD) investigation for Bottom Ash Pond 1
- Groundwater Assessment Monitoring activities
  - monitoring system evaluation
  - groundwater sampling
  - laboratory analysis
- Statistical analysis of the monitoring results

Further details concerning each of these activities are provided below.

Alternative Source Demonstration Activities

Basin elected to conduct an ASD in the spring of 2018 to evaluate whether or not an alternative source could explain the SSIs identified for Bottom Ash Pond 1 during detection monitoring. This ASD investigation involved the following activities:

- Analyzing soil samples collected from shallow soil borings at ten locations near Bottom Ash Pond 1, and
- Performing groundwater modeling to evaluate potential constituent migration pathways and transport times from potential source areas to one of the downgradient wells for Bottom Ash Pond 1.

Based on the results of this investigation, an alternative source for Bottom Ash Pond 1 SSIs could not be confirmed.

Assessment Monitoring Activities

Monitoring System Evaluation

As described in the CCR Groundwater Monitoring System Report (AECOM 2017), monitoring wells were installed around the CCR unit/multi-units at LRS with appropriate total depth and placement of the well screen to: (1) facilitate collection of representative groundwater samples from the uppermost aquifer, and (2) accurately measure water table elevations to support evaluation of groundwater gradient and flow direction (**Figure 1-2**). All monitoring wells comprising the LRS CCR monitoring system were found to be in good condition during the Assessment Monitoring events conducted in 2018.

Analysis of potentiometric surface maps constructed using the depth to groundwater measurements obtained in 2018 during groundwater Assessment Monitoring indicates the direction of groundwater flow is generally to the northeast, consistent with previous data collected during baseline detection monitoring in 2016 and 2017 (AECOM 2018b), and supports the wells selected to represent background groundwater quality and the quality of groundwater downgradient of the CCR units (**Figure 1-2**).

Groundwater Sampling and Analysis

Basin implemented an Assessment Monitoring program for the two CCR multi-units (Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill; Emergency Holding Ponds) in the spring of 2018 based on the results of Detection Monitoring as discussed in Chapter 2. The initial Assessment Monitoring event for the two multi-units was conducted in April 2018, and included analysis of collected groundwater samples for the constituents listed in Part 257 Appendix IV.

Following completion of the ASD for Bottom Ash Pond 1, Basin also initiated an Assessment Monitoring program for Bottom Ash Pond 1 in June 2018.

Assessment Monitoring sampling and analysis in 2018 was performed in general accordance with procedures established in the Sampling and Analysis Plan (AECOM 2018a). The results are presented in **Attachment A**, which also includes a representative potentiometric surface map for the uppermost aquifer, inferred groundwater flow direction and estimated velocities, and tabulated summary of field measurements and laboratory analytical data.

As presented in **Attachment A**, the following Appendix IV constituents were detected during the initial Assessment Monitoring of both CCR multi-units in April 2018: barium, chromium, fluoride, lithium, molybdenum, radium-226 and -228 (combined), and selenium. The Appendix IV constituents detected during initial Assessment Monitoring of Bottom Ash Pond 1 in June 2018 included barium, chromium, cobalt, fluoride, lithium, molybdenum and selenium.

Because one or more Appendix IV constituents were detected during the initial Assessment Monitoring event for all three CCR units/multi-units at LRS, the CCR rule required that a second, verification Assessment Monitoring event be performed for each unit/multi-unit. Verification Assessment Monitoring for the two multi-units was performed in June 2018. Verification Assessment Monitoring for Bottom Ash Pond 1 was performed in October 2018. Verification monitoring for each unit/multi-unit involved analysis for all Appendix III constituents, plus the Appendix IV constituents detected during initial Assessment Monitoring. The results of verification Assessment Monitoring are presented in **Attachment A**.

Statistical Procedures and Analysis

The CCR rule requires that concentrations of Appendix III and Appendix IV constituents detected in downgradient wells during Assessment Monitoring be compared to background concentrations using the statistical procedures in § 257.93(g). The rule also requires the establishment of GWPSs for each Appendix IV constituent detected in downgradient wells during Assessment Monitoring. The detected concentrations are then compared to the GWPSs for each constituent, which are:

- The federal Safe Drinking Water Act maximum contaminant level (MCL),
- Concentrations for cobalt, lead, lithium and molybdenum specified in § 257.95(h)(2), or
- The background concentration if it is higher than the MCL or the level specified in § 257.95(h)(2).

If exceedance of a GWPS is identified in one or more downgradient wells at statistically significant levels (SSLs), then both additional groundwater characterization and an Assessment of Corrective Measures must be initiated unless the SSLs can be attributed to a source other than the CCR unit or attributed to an error in sampling, statistical evaluation, or to natural variation in groundwater quality. The statistical analysis procedures and results for each LRS CCR unit/multi-unit are discussed below.

Bottom Ash Pond 1

Statistical analysis of the results of Detection Monitoring in 2017 indicated that Appendix III constituents boron at monitoring well MW-38B, and calcium, chloride, sulfate, and TDS at monitoring wells MW-21B and MW-38B, have SSIs over background (AECOM 2018b). These results prompted Basin to conduct an investigation in the spring of 2018 to determine whether the Appendix III SSIs could be explained by an alternative source. The results did not identify an alternative source, therefore an initial round of Assessment Monitoring for Bottom Ash Pond 1 was performed in June 2018 for all Appendix IV constituents. A second round of Assessment Monitoring for Bottom Ash Pond 1 was performed in October 2018 and involved analysis of all Appendix III constituents as well as the Appendix IV constituents detected during the initial Assessment Monitoring event in June 2018: barium, chromium, cobalt, fluoride, lithium, molybdenum, and selenium. With the exception of cobalt, these Appendix IV constituents were also detected during verification Assessment Monitoring in October 2018.

Appendix III and Appendix IV groundwater quality data from Bottom Ash Pond 1 Assessment Monitoring were evaluated using an interwell approach that statistically compared constituent concentrations at downgradient monitoring wells to those present at background monitoring wells. For Bottom Ash Pond 1, monitoring wells MW-52B and MW-53B are designated as the background wells because they are located upgradient of Bottom Ash Pond 1, and monitoring wells MW-21B, MW-38B, and MW-49B are designated as compliance wells because they are located downgradient of Bottom Ash Pond 1.

The statistical analyses were performed in accordance with the Statistical Method Certification and Statistical Methodology presented in the CCR Groundwater Monitoring System Report (AECOM 2017). Prediction limits (i.e., parametric or nonparametric) with 1 of 2 retesting were developed for each constituent based on the frequency of non-detect values and whether the background data for that constituent exhibited a normal, lognormal, or nonparametric distribution. For the statistical analysis, non-detect values were represented as one-half the detection limit. No outliers were identified in the background data. Analytical data from the background monitoring wells collected between August 2016 and October 2017 were used to develop an upper prediction limit (UPL) for the Appendix III and Appendix IV background data at 95 percent confidence or better. Data from the downgradient compliance monitoring wells for the two Assessment Monitoring events for each well were compared to the UPL to identify SSIs over background. The results from the second Assessment Monitoring event were used to verify the results of the initial Assessment Monitoring event if an SSI was identified. Mann-Kendall trend analysis was used to identify statistically significant increasing trends for constituents with SSIs. ProUCL Version 5.1 was used to store the data and run the statistical analyses. Constituents exhibiting a SSI over the background UPL were further evaluated to determine whether they are present at SSLs relative to GWPS established under § 257.95(d)(2). SSLs were identified by calculating the 95 percent lower confidence limit (95LCL) for the Assessment Monitoring data at the downgradient compliance wells at each CCR unit and comparing the 95LCL to the established GWPS. A constituent is present at a SSL over the GWPS if the 95LCL is greater than the GWPS.

Table 6-1 summarizes the statistically determined background UPLs of each Appendix III and Appendix IV constituent for Bottom Ash Pond 1. **Table 6-1** also identifies applicable Appendix IV GWPSs, whether or not each Appendix IV constituent concentration measured in the downgradient wells exceeds the GWPS by direct comparison, and if constituent concentrations are present at a SSL above the GWPS. Lithium and molybdenum at monitoring well MW-38B exceed their respective GWPSs at a SSL. While selenium concentrations at monitoring wells MW-21B and MW-38B exceed the GWPS by direct comparison, their 95LCL does not exceed the GWPS.

Because lithium and molybdenum in downgradient compliance monitoring well MW-38B exceed the GWPS at a SSL, additional groundwater characterization and an Assessment of Corrective Measures must be initiated. Basin concluded the available data indicate that the SSLs associated with Bottom Ash Pond 1 cannot currently be attributed to a source other than the CCR unit or attributed to error in sampling, statistical evaluation, or natural variation in groundwater quality.

Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill Multi-unit

Appendix III and Appendix IV groundwater quality data collected in April and June 2018 were evaluated for the Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill multi-unit using an interwell approach that statistically compared constituent concentrations at downgradient monitoring wells to those present at background monitoring wells. For the multi-unit (Ash Ponds 2 and 3 and the Ash Landfill), monitoring wells MW-32B and MW-39B are designated as the background wells because they are located upgradient of the multiunit, and monitoring wells MW-14BR, MW-20B, MW-36B, MW-37B, MW-40B, MW-52B, and MW-53B are designated as compliance wells because they are located downgradient of the facility.

The statistical analyses were performed in accordance with the Statistical Method Certification and Statistical Methodology presented in the CCR Groundwater Monitoring System Report (AECOM 2017) as summarized above for Bottom Ash Pond 1.

Table 6-2 summarizes the statistically determined background UPLs of each Appendix III and Appendix IV constituent for the Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill multi-unit. **Table 6-2** also identifies applicable Appendix IV GWPSs, whether or not each Appendix IV constituent concentration measured in the downgradient wells exceeds a GWPS by direct comparison, and if the constituent concentrations are present at a SSL above the GWPS. Assessment Monitoring of the Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill multi-unit found that concentrations of some Appendix IV constituents (chromium, fluoride, selenium) exhibited SSIs above background values, but were below the GWPSs. Therefore, Assessment Monitoring of this multi-unit must continue on a semi-annual basis per the requirements of § 257.95.

Emergency Holding Ponds

Appendix III and IV groundwater quality data collected in April and June 2018 were evaluated for the Emergency Holding Ponds multi-unit using an interwell approach that statistically compared constituent concentrations at downgradient compliance monitoring wells to those present at background monitoring wells. For the Emergency Holding Ponds, monitoring wells MW-41B, MW-42B, and MW-43B are designated as the background wells because they are located upgradient of the holding ponds, and monitoring wells MW-44BB, MW-45B, MW-46B, and MW-47B are designated as compliance wells because they are located downgradient of the ponds.

The statistical analyses were performed in accordance with the Statistical Method Certification and Statistical Methodology presented in the CCR Groundwater Monitoring System Report (AECOM 2017) as summarized above for Bottom Ash Pond 1.

Table 6-3 summarizes the statistically determined background UPLs of each Appendix III and IV constituent for the Emergency Holding Ponds multi-unit. **Table 6-3** also identifies applicable Appendix IV GWPSs, whether or not each Appendix IV constituent concentration measured in the downgradient wells exceeds a GWPS by direct comparison, and if the constituent concentrations are present at a SSL above the GWPS. Assessment Monitoring of the Emergency Holding Ponds multi-unit found that concentrations of some Appendix IV constituents (barium, fluoride) exhibited SSIs above background values, but were below the GWPSs, using the statistical procedures in § 257.93(g). Therefore, Assessment Monitoring of this multi-unit must continue on at least a semi-annual basis per the requirements of § 257.95.

4. General Information

The following subsections summarize any problems encountered in the LRS CCR program through 2018, any resolutions to those problems, if needed and upcoming actions planned for 2019.

Problems Encountered

No problems were encountered during the 2018 monitoring period.

Actions Planned for 2019

Basin plans on continuing the Assessment Monitoring program for the three CCR unit/multi-units at LRS in 2019. The Assessment Monitoring program will include semi-annual groundwater sampling events and the required statistical evaluations. Basin also plans to initiate an Assessment of Corrective Measures for Bottom Ash Pond 1. Any notifications required by 40 CFR § 257.95 (e) or (g) will be transmitted accordingly.

5. Summary and Conclusions

AECOM, on behalf of Basin, conducted two rounds of CCR groundwater Assessment Monitoring for each CCR units/multi-units at LRS in 2018. The results were used to establish background groundwater quality for Appendix III and Appendix IV constituents in the uppermost aquifer, identify appropriate GWPSs, and determine whether any GWPSs were exceeded at statistically significant levels downgradient of the three CCR unit/multi-units at LRS:

1. Bottom Ash Pond 1 (Assessment Monitoring in June and October 2018)
2. Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill (Assessment Monitoring in April and June 2018)
3. Emergency Holding Ponds (Assessment Monitoring in April and June 2018).

Statistical analysis of the Assessment Monitoring results identified an SSI for at least one Appendix III constituent for each LRS CCR unit/multi-units. SSLs were also identified for concentrations of lithium and molybdenum in MW-38B downgradient of Bottom Ash Pond 1. Based on these results, continued Assessment Monitoring is required for all three CCR unit/multi-units on a semi-annual basis in 2019. Also, an Assessment of Corrective Measures is required for Bottom Ash Pond 1.

6. References

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AECOM. 2018a. Sampling and Analysis Plan, CCR Monitoring Program, Laramie River Station, Wheatland, Wyoming. Basin Electric Power Cooperative. January 2018.

AECOM. 2018b. First Annual Groundwater Monitoring and Corrective Action Report, 2016-2017, Laramie River Station, Wheatland, Wyoming. Basin Electric Power Cooperative. January 2018.

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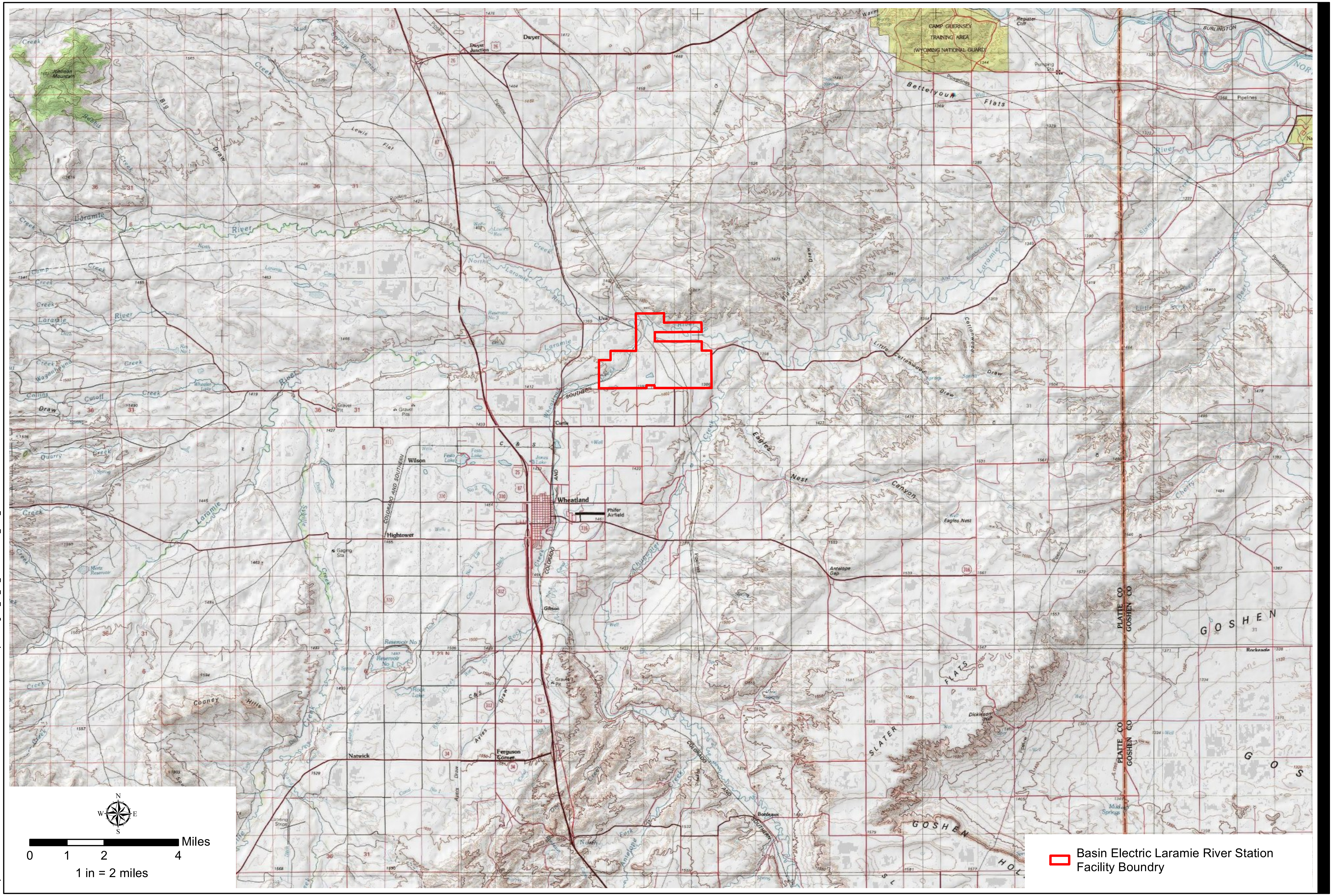
Figures



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AECOM

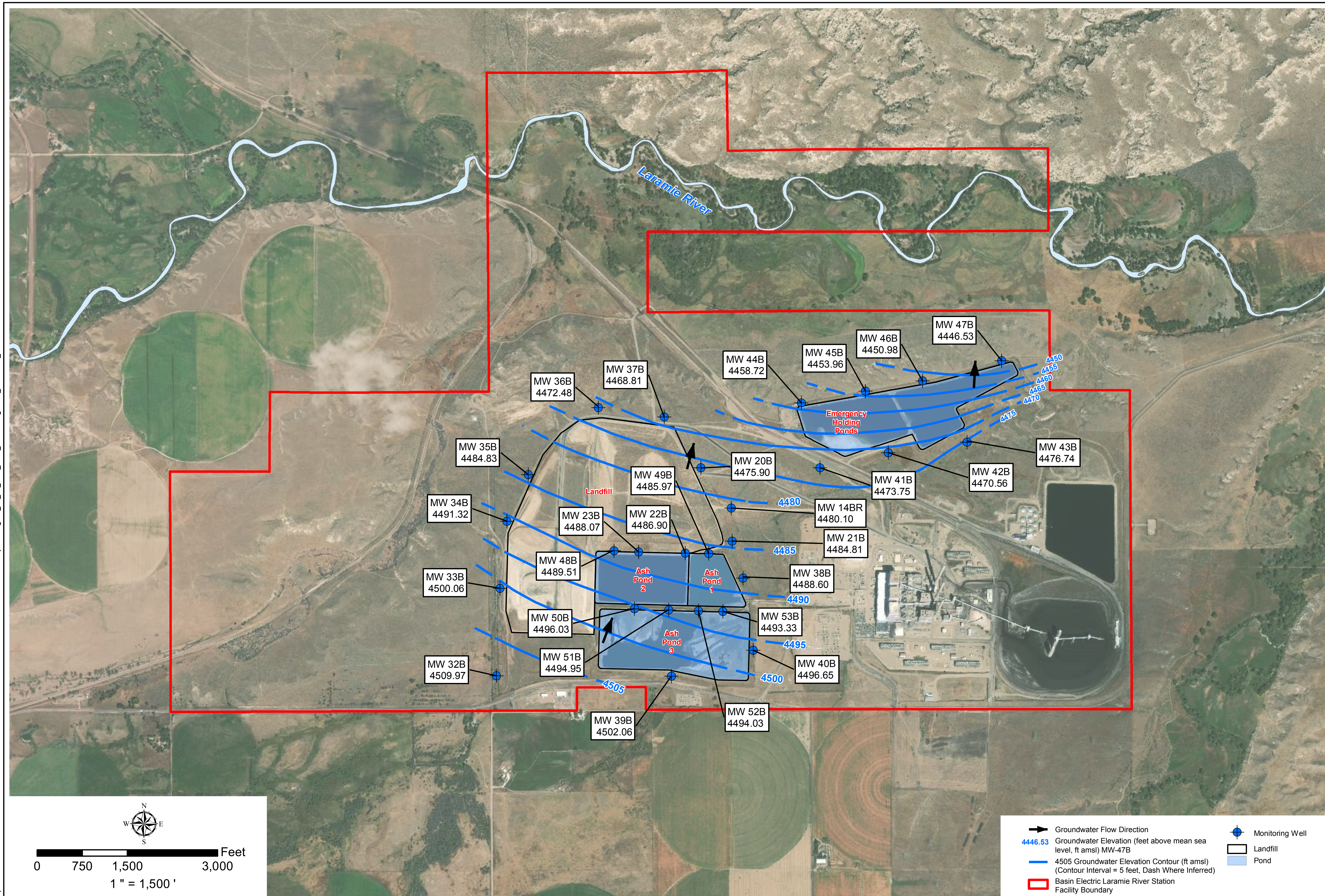
Figure: 1-1

Site Location Map

Basin Electric
Laramie River Station
Platte County, Wyoming
Project No.: 60506860 Date: 09/28/2016

Figure: 1-2

Potentiometric Surface Map June 26-28, 2018



Basin Electric
Laramie River Station
Platte County, Wyoming
Project No.: 60577052

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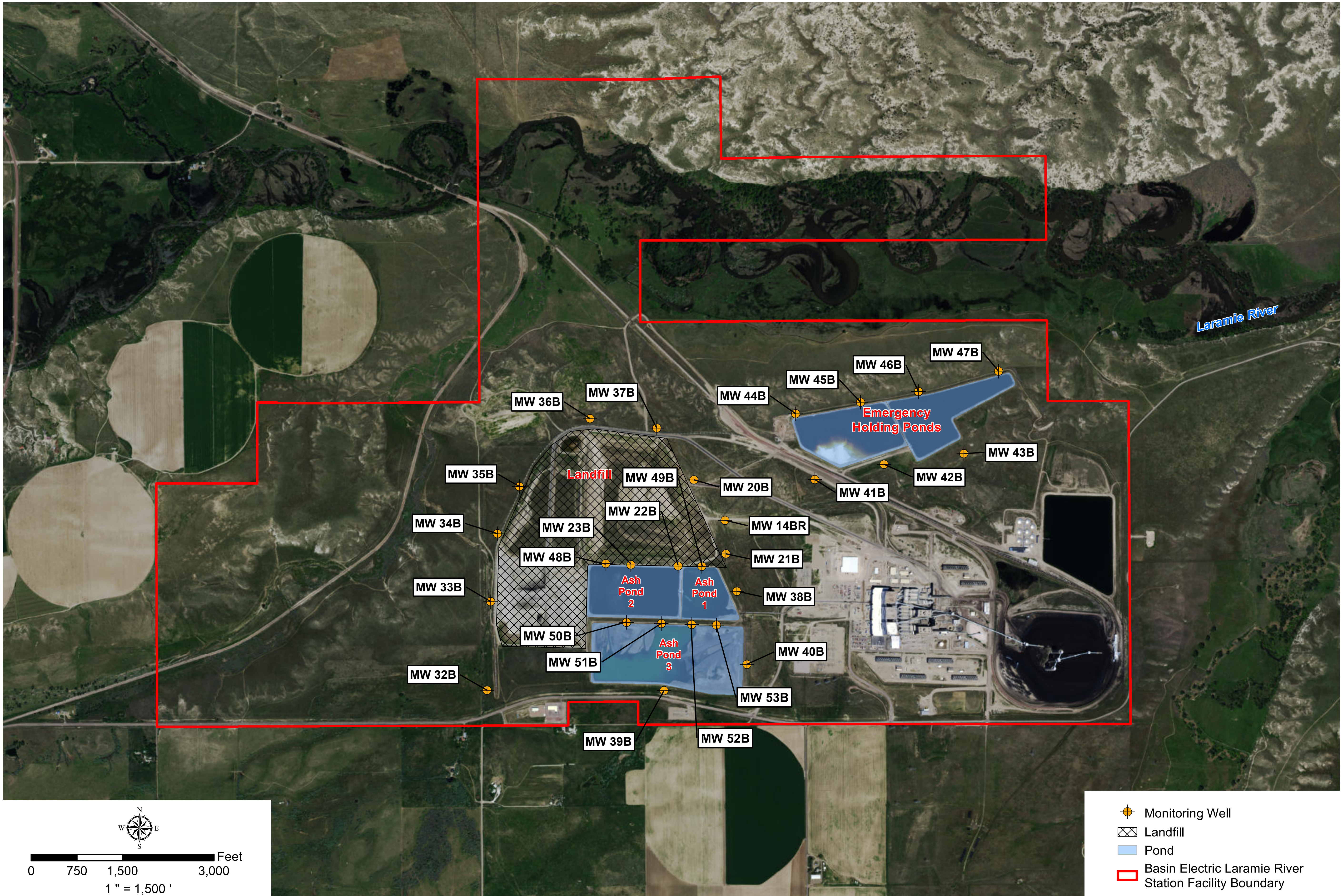

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Figure: 2-1

LRS CCR Monitoring Well Network

Basin Electric
Laramie River Station
Platte County, Wyoming
Project No.: 60506860 Date: 9/13/2017

Tables

Table 6-1 Statistical Analysis Methods and Results - Bottom Ash Pond 1

Parameter (units)	Number of Samples	Percent Nondetects	Normal or Lognormal Distribution?	Statistical Test	Background UPL	GWPS Basis	GWPS	SSI above Background?	Exceeds GWPS?	SSL Above GWPS?
Appendix III										
Boron (mg/L)	20	40	No/No	Nonparametric	0.17	----	----	No	----	----
Calcium (mg/L)	20	0	Yes/Yes	Parametric	177	----	----	Yes	----	----
Chloride (mg/L)	20	0	No/No	Nonparametric	43	----	----	Yes	----	----
Fluoride (mg/L)	22	45	No/No	Nonparametric	1.33	----	----	No	----	----
pH (std units)	20	0	No/No	Nonparametric	8.98	----	----	No	----	----
Sulfate (mg/L)	20	0	No/No	Nonparametric	499	----	----	Yes	----	----
TDS (mg/L)	20	0	No/No	Nonparametric	1,100	----	----	Yes	----	----
Appendix IV										
Barium (mg/L)	22	0	No/Yes	Parametric	0.192	MCL	2	No	No	No
Chromium (mg/L)	22	59	No/No	Nonparametric	0.011	MCL	0.1	Yes (MW-21B)	No	No
Cobalt (mg/L)	20	80	No/No	Nonparametric	0.004	§257.95(h)(2)	0.006	No	No	No
Fluoride (mg/L)	22	45	No/No	Nonparametric	1.33	MCL	4	No	No	No
Lithium (mg/L)	22	0	Yes/Yes	Parametric	0.056	§257.95(h)(3)	0.056	Yes (MW-38B)	Yes (MW-38B)	Yes (MW-38B)
Molybdenum (mg/L)	22	0	Yes/Yes	Parametric	0.016	§257.95(h)(2)	0.1	Yes (MW-21B, MW-38B)	Yes (MW-38B)	Yes (MW-38B)
Selenium (mg/L)	22	82	No/No	Nonparametric	0.007	MCL	0.05	Yes (MW-21B, MW-38B)	Yes (MW-21B)	No

UPL - upper prediction limit
GWPS - groundwater protection standard
SSI - statistically signficiant increase
SSL - statistically significant level (95LCL exceeds GWPS)
MCL - maximum contaminant level
mg/L - milligram per liter
pCi/L - picocuries per liter

Table 6-2 Statistical Analysis Methods and Results - Ash Pond 2, Ash Pond 3, Ash Landfill Multiunit

Parameter (units)	Number of Samples	Percent Nondetects	Normal or Lognormal Distribution?	Statistical Test	Background UPL	GWPS Basis	GWPS	SSI above Background?	Exceeds GWPS?	SSL Above GWPS?
Appendix III										
Boron (mg/L)	18	0	No/No	Nonparametric	0.31	----	----	No	----	----
Calcium (mg/L)	18	0	Yes/Yes	Parametric	210	----	----	Yes (MW-37B)	----	----
Chloride (mg/L)	18	0	No/No	Nonparametric	86	----	----	Yes (MW-37B)	----	----
Fluoride (mg/L)	20	0	Yes/Yes	Parametric	0.74	----	----	Yes (MW-20B, MW-40B, MW-53B)	----	----
pH (std units)	18	0	No/No	Nonparametric	6.37/7.78	----	----	No	----	----
Sulfate (mg/L)	18	0	No/No	Nonparametric	845	----	----	No	----	----
TDS (mg/L)	18	0	No/No	Nonparametric	1,800	----	----	No	----	----
Appendix IV										
Barium (mg/L)	20	0	No/Yes	Parametric	0.096	MCL	2	No	No	No
Chromium (mg/L)	20	100	No/No	Nonparametric	0.002	MCL	0.1	Yes (MW-14BR)	No	No
Fluoride (mg/L)	20	0	Yes/Yes	Parametric	0.75	MCL	4	Yes (MW-20B, MW-40B, MW-53B)	No	No
Lithium (mg/L)	20	0	Yes/Yes	Parametric	0.085	§257.95(h)(3)	0.085	No	No	No
Molybdenum (mg/L)	20	10	No/Yes	Parametric	0.056	§257.95(h)(2)	0.100	No	No	No
Radium 226+228 (pCi/L)	20	25	Yes/Yes	Parametric	1.216	MCL	5	No	No	No
Selenium (mg/L)	20	100	No/No	Nonparametric	0.005	MCL	0.05	Yes (MW-14BR, MW-37B,MW-40B,MW-53B)	No	No

UPL - upper prediction limit
GWPS - groundwater protection standard
SSI - statistically signficiant increase
SSL - statistically significant level (95LCL exceeds GWPS)
MCL - maximum contaminant level
mg/L - milligram per liter
pCi/L - picocuries per liter

Table 6-3 Statistical Analysis Methods and Results - Emergency Holding Ponds

Parameter (units)	Number of Samples	Percent Nondetects	Normal or Lognormal Distribution?	Statistical Test	Background UPL	GWPS Basis	GWPS	SSI above Background?	Exceeds GWPS?	SSL Above GWPS?
Appendix III										
Boron (mg/L)	27	0	No/No	Nonparametric	1.07	----	----	No	----	----
Calcium (mg/L)	27	0	Yes/No	Parametric	497	----	----	No	----	----
Chloride (mg/L)	27	0	No/No	Nonparametric	320	----	----	No	----	----
Fluoride (mg/L)	30	83	No/No	Nonparametric	0.74	----	----	Yes (MW-44B, MW-45B)	----	----
pH (std units)	26	0	No/No	Nonparametric	6.45/7.85	----	----	No	----	----
Sulfate (mg/L)	27	7	No/No	Nonparametric	2,200	----	----	No	----	----
TDS (mg/L)	27	0	No/No	Nonparametric	4,000	----	----	No	----	----
Appendix IV										
Barium (mg/L)	30	0	No/Yes	Parametric	0.061	MCL	2	Yes (MW-47B)	No	No
Chromium (mg/L)	30	17	No/Yes	Parametric	0.012	MCL	0.1	No	No	No
Fluoride (mg/L)	30	83	No/No	Nonparametric	0.74	MCL	4	Yes (MW-44B, MW-45B)	No	No
Lithium (mg/L)	30	0	Yes/Yes	Parametric	0.088	§257.95(h)(2)	0.088	No	No	No
Molybdenum (mg/L)	30	0	No/No	Nonparametric	0.180	§257.95(h)(2)	0.18	No	No	No
Radium 226+228 (pCi/L)	30	50	No/Yes	Parametric	1.107	MCL	5	No	No	No
Selenium (mg/L)	30	57	No/No	Nonparametric	0.012	MCL	0.05	No	No	No

UPL - upper prediction limit
GWPS - groundwater protection standard
SSI - statistically signficiant increase
SSL - statistically significant level (95LCL exceeds GWPS)
MCL - maximum contaminant level
mg/L - milligram per liter
pCi/L - picocuries per liter

Attachment A

Sampling and Analysis Report, 2016-2017

AECOM Imagine it. Delivered.

2018 Sampling and Analysis Report, CCR Monitoring Program

Laramie River Station
Wheatland, Wyoming

Basin Electric Power Cooperative

January 31, 2019

Prepared for:

Basin Electric Power Cooperative
Bismarck, North Dakota

Prepared by:

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Project number: 60577052

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List of Acronyms

CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
LRS	Laramie River Station
QA/QC	quality assurance/quality control

1. Introduction

On behalf of Basin Electric Power Cooperative (Basin), AECOM Technical Services, Inc. (AECOM) prepared this Coal Combustion Residuals (CCR) Groundwater Sampling and Analysis Report for the Basin Laramie River Station (LRS). The objective of the report is to provide a description of the field and office activities performed in 2018 in support of the LRS CCR groundwater monitoring program.

This Sampling and Analysis Report was prepared to present the results of sampling and analysis of groundwater conducted for the monitoring requirements of the United States Environmental Protection Agency (EPA) CCR rule (Chapter 40 of the Code of Federal Regulations (CFR), §§ 257.90 to 257.98). Specifically, the data collected for the groundwater Assessment Monitoring events conducted in 2018.

2. Groundwater Flow

As required by 40 CFR § 257.93(c), groundwater elevations were measured in each well prior to purging each time groundwater was sampled. The measurements, presented in **Table 1**, were used to create potentiometric surface maps for the uppermost aquifer for the baseline monitoring events. The resulting potentiometric surface maps (contained in the operating record) were used to evaluate the direction of groundwater flow and hydraulic gradient for each subject CCR unit/multi-unit. **Figure 1** represents a potentiometric surface map constructed using measurements taken on June 26-28, 2018, and shows inferred groundwater flow directions for each CCR unit/multi-unit. This potentiometric map is generally consistent with the groundwater flow patterns observed during the other CCR monitoring events performed at LRS in 2018. Groundwater flow velocities were calculated for each unit/multi-unit, as presented in **Appendix I** and summarized in **Table 2**.

Based on the groundwater flow conditions documented in this chapter, the relative function of the monitoring wells employed in the LRS CCR groundwater monitoring system is as follows:

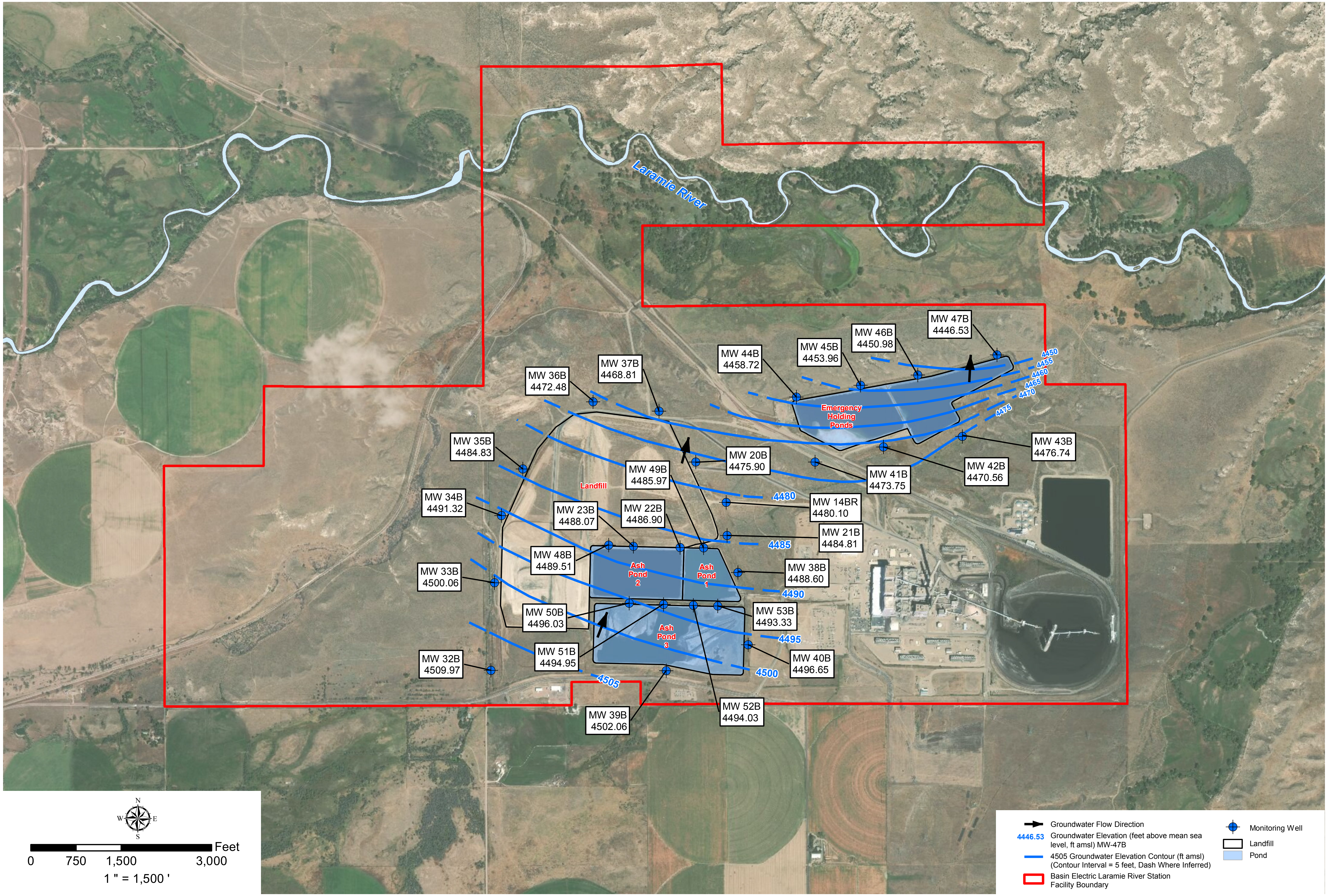
CCR unit/multi-unit	Background wells	Downgradient wells
Bottom Ash Pond 1	MW-52B, MW-53B	MW-49B, MW-21B, MW-38B
Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill	MW-39B, MW-32B	MW-36B, MW-37B, MW-20B, MW-14BR, MW-40B, MW-52B, MW-53B
Emergency Holding Ponds	MW-41B, MW-42B, MW-43B	MW-44B, MW-45B, MW-46B, MW-47B

The following eight monitoring wells are also included in the LRS CCR monitoring system for the purpose of measuring groundwater elevations and evaluating groundwater flow direction and velocity in the vicinity of the bottom ash ponds and landfill: MW-22B, MW-23B, MW-33B, MW-34B, MW-35B, MW-48B, MW-50B, and MW-51B.

3. Groundwater Quality

The analytical testing laboratory provided reports presenting the results of laboratory analysis for each monitoring event. These laboratory reports are included in the operating record, and were reviewed for completeness against the project-required methods and the chain-of-custody forms. Laboratory reports were also reviewed for holding times, and that the data was appropriately flagged based on the quality assurance/quality control (QA/QC) data provided. Data validation reports were prepared for each monitoring event and are included in the operating record. The validated results were compiled into summary form for each CCR unit/multi-unit as presented in **Tables 3, 4** and **5**. **Table 6** contains the results of QA/QC field blank samples collected during the monitoring events.

Figures



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Potentiometric Surface Map June 26-28, 2018

Basin Electric
Laramie River Station
Platte County, Wyoming
Project No.: 60577052

AECOM

Figure: 1

Tables

Table 1 Groundwater Level Measurements and Elevations

Location ID	Top of Casing Elevation (feet amsl)	Date	Depth To Water (feet)	Water Level Elevation (feet amsl)	Date	Depth To Water (feet)	Water Level Elevation (feet amsl)	Date	Depth To Water (feet)	Water Level Elevation (feet amsl)
MW-14BR	4537.90	4/4/2018	57.96	4479.94	6/27/2018	57.80	4480.10	10/25/2018	57.53	4480.37
MW-20B	4535.47	4/3/2018	60.11	4475.36	6/26/2018	59.57	4475.90	10/25/2018	59.65	4475.82
MW-21B	4539.58	4/4/2018	55.06	4484.52	6/27/2018	54.77	4484.81	10/24/2018	54.40	4485.18
MW-22B	4569.21	4/3/2018	82.950	4486.255	6/28/2018	82.31	4486.90	10/25/2018	82.23	4486.98
MW-23B	4569.48	4/3/2018	82.280	4487.201	6/28/2018	81.41	4488.07	10/25/2018	81.25	4488.23
MW-32B	4567.11	4/3/2018	57.75	4509.36	6/27/2018	57.14	4509.97	10/25/2018	56.77	4510.34
MW-33B	4566.61	4/3/2018	67.22	4499.39	6/28/2018	66.55	4500.06	10/25/2018	66.15	4500.46
MW-34B	4554.72	4/3/2018	64.18	4490.54	6/28/2018	63.40	4491.32	10/25/2018	63.35	4491.37
MW-35B	4548.67	4/3/2018	64.45	4484.22	6/28/2018	63.84	4484.83	10/25/2018	63.63	4485.04
MW-36B	4532.44	4/3/2018	60.44	4472.00	6/27/2018	59.96	4472.48	10/25/2018	59.84	4472.60
MW-37B	4530.37	4/3/2018	61.98	4468.39	6/26/2018	61.56	4468.81	10/25/2018	61.67	4468.70
MW-38B	4547.48	4/4/2018	59.06	4488.42	6/27/2018	58.88	4488.60	10/25/2018	58.60	4488.88
MW-39B	4581.45	4/3/2018	79.86	4501.59	6/27/2018	79.39	4502.06	10/25/2018	79.02	4502.43
MW-40B	4589.59	4/3/2018	93.46	4496.13	6/27/2018	92.94	4496.65	10/25/2018	92.63	4496.96
MW-41B	4529.64	4/4/2018	56.44	4473.20	6/26/2018	55.89	4473.75	10/25/2018	55.65	4473.99
MW-42B	4515.83	4/4/2018	46.56	4469.27	6/26/2018	45.27	4470.56	10/25/2018	44.11	4471.72
MW-43B	4501.44	4/4/2018	32.57	4468.87	6/26/2018	24.70	4476.74	10/25/2018	26.96	4474.48
MW-44B	4529.39	4/4/2018	71.04	4458.35	6/26/2018	70.67	4458.72	10/25/2018	71.10	4458.29
MW-45B	4530.92	4/4/2018	77.52	4453.40	6/26/2018	76.96	4453.96	10/25/2018	77.26	4453.66
MW-46B	4527.72	4/4/2018	77.16	4450.56	6/26/2018	76.74	4450.98	10/25/2018	76.55	4451.17
MW-47B	4522.60	4/4/2018	76.92	4445.68	6/26/2018	76.07	4446.53	10/25/2018	75.77	4446.83
MW-48B	4568.66	4/3/2018	79.82	4488.84	6/28/2018	79.15	4489.51	10/25/2018	78.99	4489.67
MW-49B	4564.36	4/4/2018	78.70	4485.66	6/27/2018	78.39	4485.97	10/24/2018	78.00	4486.36
MW-50B	4588.34	4/4/2018	92.84	4495.50	6/28/2018	92.31	4496.03	10/25/2018	92.06	4496.28
MW-51B	4588.90	4/4/2018	94.49	4494.41	6/28/2018	93.95	4494.95	10/25/2018	93.76	4495.14
MW-52B	4589.60	4/4/2018	96.04	4493.56	6/27/2018	95.57	4494.03	10/24/2018	95.25	4494.35
MW-53B	4589.23	4/4/2018	96.23	4493.00	6/27/2018	95.90	4493.33	10/24/2018	95.53	4493.70

Notes:
TOC = top of casing
amsl = above mean sea level

Table 2 Groundwater Velocities

CCR Unit/Multi-Unit	Calculated Seepage Velocities (ft/day)		
	Minimum	Maximum	Average
Bottom Ash Pond 1	0.026	0.43	0.23
Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill	0.013	2.5	1.26
Emergency Holding Ponds	0.036	3.7	1.88

Table 3 Groundwater Analytical Data – Bottom Ash Pond 1

				Appendix III Constituents							Appendix IV Constituents														
		Analyte Name		Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226/228	Selenium	Thallium
		Unit		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	mg/L	mg/L
Relative Location	MW ID	Date	Type																						
Background	MW-52B	7/19/2017	N	0.15	120	33	0.50	7.91	370	820	0.0020 U	0.0050 U	0.130	0.0010 U	0.0010 U	0.0058	0.0014	0.50	0.0010 U	0.048	0.00020 U	0.013	0.35 U	0.0050 U	0.0010 U
		8/25/2017	N	0.16	120	41	0.50 U	7.54	410	920	0.0020 U	0.0050 U	0.120	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.50 U	0.0010 U	0.039	0.00020 U	0.0094	0.903	0.0050 U	0.0010 U
		8/31/2017	N	0.16	160	41	0.50 U	7.61	420	930	0.0020 U	0.0050 U	0.240	0.0010 U	0.0010 U	0.011	0.0040	0.50 U	0.0041	0.063	0.00020 U	0.0088	1.250 U	0.0050 U	0.0010 U
		9/6/2017	N	0.17	140	41 J	0.50 U	7.61	430	980	0.0020 U	0.0050 U	0.110	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.50 U	0.0010 U	0.045	0.00020 U	0.0083	1.200 U	0.0050 U	0.0010 U
		9/14/2017	N	0.16	130	43	0.50 U	7.46	430	940	0.0020 U	0.0050 U	0.120	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.50 U	0.0010 U	0.049	0.00020 U	0.0071	0.482	0.0050 U	0.0010 U
		9/18/2017	N	0.15	130	41	0.50 U	7.45	420	1000	0.0020 U	0.0050 U	0.110	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.50 U	0.0010 U	0.049	0.00020 U	0.0066	0.566	0.0050 U	0.0010 U
		9/27/2017	N	0.15	140	40	0.50 U	7.55	430	960	0.0020 U	0.0050 U	0.110	0.0010 U	0.0010 U	0.002 U	0.0010	0.50 U	0.0010 U	0.050	0.00020 U	0.0063	0.370 U	0.0050 U	0.0010 U
		10/3/2017	N	0.15	130	42	0.50 U	7.74	430	1000	0.0020 U	0.0050 UJ	0.096	0.0010 U	0.0010 U	0.002 U	0.0010 UJ	0.50 U	0.0010 U	0.048	0.00020 U	0.0056	0.576 UJ	0.0050 U	0.0010 U
		4/4/2018	N	----	----	----	0.50 U	----	----	----	0.0020 U	0.0050 U	0.109 J+	0.0010 U	0.0010 U	0.002 U	0.0010	0.50 U	0.0010 U	0.048	0.00020 U	0.0053	0.617 J	0.0050 U	0.0010 U
		6/27/2018	N	0.16	175	39 J+	0.50 U	7.39	499	1080	0.0020 U	0.0050 U	0.086 J+	0.0010 U	0.0010 U	0.002 U	----	0.50 U	0.0010 U	0.048	0.00020 U	0.0045	0.873 U	0.0050 U	0.0010 U
		10/24/2018	N	0.16	168	41	0.50 U	7.32	469	1100 J+	----	----	0.082	----	----	0.002 U	0.0010 U	0.50 U	----	0.039	----	0.0041	----	0.0050	----
	MW-53B	7/19/2017	N	0.10 U	95	32	0.96	8.63	220	570	0.0020 U	0.0050 U	0.100	0.0010 U	0.0010 U	0.0045	0.0010 U	0.96	0.0010 U	0.042	0.00020 U	0.0140	0.682 U	0.0060	0.0010 U
		8/25/2017	N	0.10 U	81	34	0.91	8.48	210	560	0.0020 U	0.0050 U	0.120	0.0010 U	0.0010 U	0.0038	0.0010 U	0.91	0.0010 U	0.033	0.00020 U	0.0140	1.090	0.0050 U	0.0010 U
		8/31/2017	N	0.10 U	82	33	0.88	8.72	220	540	0.0020 U	0.0050 U	0.130	0.0010 U	0.0010 U	0.0045	0.0010 U	0.88	0.0010 U	0.042	0.00020 U	0.0150	0.426 U	0.0050 U	0.0010 U
		9/6/2017	N	0.10 U	79	33 J	1.00	8.98	210	560	0.0020 U	0.0050 U	0.130	0.0010 U	0.0010 U	0.0052	0.0010 U	1.00	0.0010 U	0.035	0.00020 U	0.0150	0.407 U	0.0050 U	0.0010 U
		9/14/2017	N	0.10 U	77	33	0.93	7.79	220	590	0.0020 U	0.0050 U	0.094	0.0010 U	0.0010 U	0.0028	0.0010 U	0.93	0.0010 U	0.038	0.00020 U	0.0120	0.424 U	0.0050 U	0.0010 U
		9/18/2017	N	0.10 U	76	33	1.00	7.52	210	580	0.0020 U	0.0050 U	0.094	0.0010 U	0.0010 U	0.0033	0.0010 U	1.00	0.0010 U	0.041	0.00020 U	0.0120	0.432 U	0.0050 U	0.0010 U
		9/27/2017	N	0.10 U	78	32	1.10	7.96	220	620	0.0020 U	0.0050 U	0.070	0.0010 U	0.0010 U	0.002 U	0.0010 U	1.10	0.0010 U	0.042	0.00020 U	0.0100	0.375 U	0.0050 U	0.0010 U
		10/3/2017	N	0.10 U	78	33	1.10	7.79	220	610	0.0020 U	0.0050 UJ	0.081	0.0010 U	0.0010 U	0.0022	0.0010 UJ	1.10	0.0010 U	0.040	0.00020 U	0.0110	1.880 UJ	0.0050 U	0.0010 U
		4/4/2018	N	----	----	----	1.14	----	----	----	0.0020 U	0.0050 U	0.055 J+	0.0010 U	0.0010 U	0.002 U	0.0010 U	1.14	0.0010 U	0.042	0.00020 U	0.0070	0.370 UJ	0.0069	0.0010 U
		6/27/2018	N	0.10	102	37 J+	1.33 J+	7.62	242	691	0.0020 U	0.0050 U	0.052 J+	0.0010 U	0.0010 U	0.002 U	----	1.33 J+	0.0010 U	0.038	0.00020 U	0.0085	0.400 U	0.0064	0.0010 U
		10/24/2018	N	0.11	98	41	1.21	7.68	231	711 J+	----	----	0.053	----	----	0.002 U	0.0010 U	1.21	----	0.041	----	0.0067	----	0.0071	----
Down-gradient	MW-21B	11/11/2016	N	0.16	290	250	0.76	6.63	680	1600 J	0.0020 U	0.0050 U	0.061	0.0010 U	0.0010 U	0.021	0.0010 U	0.76	0.0021	0.046	0.00020 U	0.0160	0.513	0.0350	0.0010 U
		12/15/2016	N	0.16	270	250	0.75	7.65	680	1600	0.0020 U	0.0050 U	0.068	0.0010 U	0.0010 U	0.021	0.0010 U	0.75	0.0015	0.044	0.00020 U	0.0150	0.694	0.0340	0.0010 U
		2/14/2017	N	0.16	290	250	0.77	7.66	660	1500	0.0020 U	0.0050 U	0.059	0.0010 U	0.0010 U	0.023	0.0010 U	0.77	0.0010 U	0.046	0.00020 U	0.0160	0.385 U	0.0360	0.0010 U
		4/4/2017	N	0.16	280	280	0.71	7.49	740	1700 J	0.0200 U	0.0500 U	0.053	0.0100 U	0.0100 U	0.031	0.0100 U	0.71	0.0100 U	0.049	0.00020 U	0.0200 U	0.310 U	0.0500 U	0.0100 U
		4/25/2017	N	0.16	290	290	0.73	7.53	770	1800	0.0020	0.0050	0.049	0.0050	0.0010	0.037	0.0010	0.73	0.0010	0.041	0.00020	0.0170	0.328	0.0490	0.0010
		5/16/2017	N	0.18	280	290	0.72	7.53	760	1800	0.0020 U	0.0050 U	0.049 J	0.0010 U	0.0010 U	0.041	0.0010 U	0.72	0.0010 U	0.043	0.00020 U	0.0160	0.384 U	0.0520	0.0010 U
		6/14/2017	N	0.16	290	300	0.73	7.46	760	1900	0.0020 U	0.0050 U	0.045	0.0010 U	0.0010 U	0.039	0.0010 U	0.73	0.0010 U	0.050	0.00020 U	0.0160	0.606	0.0470	0.0010 U
		7/26/2017	N	0.15	260	270	0.70	7.74	670	1600	0.0020 U	0.0050 U	0.057	0.0010 U	0.0010 U	0.038	0.0010 U	0.70	0.0010 U	0.040	0.00020 U	0.0120	0.394 U	0.0440	0.0010 U
		6/27/2018	N	----	----	----	0.83 J+	7.51	----	----	0.0020 U	0.0050 U	0.057 J+	0.0010 U	0.0010 U	0.0258	0.0010 U	0.83 J+	0.0010 U	0.042	0.00020 U	0.0164	0.345 U	0.0508	0.0010 U
		10/24/2018	FD	0.17	289	270	0.70	7.51	714	1670 J+	----	----	0.045	----	----	0.0343	0.0010 U	0.70	----	0.044	----	0.0172	----	0.0542	----
		10/24/2018	N	0.17	280	268	0.71	7.51	699	1380 J+	----	----	0.045	----	----	0.0346	0.0010 U	0.71	----	0.039	----	0.0168	----	0.0526	----
	MW-38B	9/1/2016	N	3.00	510	400	1.00 U	7.30	4600	7800	0.0020 U	0.0050 U	0.050	0.0010 U	0.0010 U	0.0042	0.0029	1.00 U	0.0010 U	0.130	0.00020 U	0.2100	0.604	0.0120	0.0010 U
		11/10/2016	N	3.00	500	500	1.00 U	7.11	4800	4800	0.0100 U	0.0050 U	0.038	0.0050 U	0.0050 U	0.0087	0.0014	1.00 U	0.0010 U	0.130	0.00020 U	0.1800	0.412 U	0.0250 U	0.0010 U
		12/15/2016	N	3.00	470	490	1.00 U	7.35	5000	7800	0.0020 U	0.0050 U	0.034	0.0010 U	0.0010 U	0.01	0.0014	1.00 U	0.0010 U	0.130	0.00020 U	0.1900	0.514	0.0120	0.0010 U
		2/14/2017	N	2.80	460	470	1.00 U	7.38	4800	7700	0.0020 U	0.0050 U	0.060	0.0010 U	0.0010 U	0.013	0.0015	1.00 U	0.0010 U	0.130	0.00020 U	0.1900	0.308 U	0.0120	0.0010 U
		4/4/2017	N	2.90	440	420	1.00 U	7.28	4700	7800	0.0200 U	0.0500 U	0.026	0.0100 U	0.0100 U	0.02 U	0.0100 U	1.00 U	0.0100 U	0.150	0.00020 U	0.1700	0.317 U	0.0500 U	0.0100 U
		5/16/2017	FD	3.00	460	410	0.50 U	7.31	4800	7700	0.0020 U	0.0050 U	0.023 J	0.0010 U	0.0010 U	0.0091	0.0010 U	0.50 U	0.0010 U	0.140	0.00020 U	0.2000	0.400 U	0.0130	0.0010 U
		5/16/2017	N	2.80	420	410	0.60	7.31	4700	8000	0.0020 U	0.0050 U	0.025 J	0.0010 U	0.0010 U	0.01	0.0010 U	0.60	0.0010 U	0.130	0.00020 U	0.2100	0.357 U	0.0130	0.0010 U
		6/14/2017	N	2.80	480	400	1.00 U	7.23	5000	8000	0.0020 U	0.0050 U	0.023	0.0010 U	0.0010 U	0.0088	0.0010 U	1.00 U	0.0010 U	0.140	0.00020 U	0.2000	0.534	0.0120	0.0010 U
		7/26/2017	FD	3.00	470	390	0.50 U	7.47	4600	7800	0.0020 U	0.0050 U	0.031	0.0010 U	0.0010 U	0.0099	0.0010	0.50 U	0.0010 U	0.140	0.00020 U	0.1900	0.336 U	0.0120	0.0010 U
		7/26/2017	N	3.00	470	390	0.50 U	7.47	4900	8000	0.0020 U	0.0050 U	0.034	0.0013	0.0011	0.011	0.0021	0.50 U	0.0018	0.130	0.00020 U	0.1900	0.671 U	0.0130	0.0010
		6/27/2018	N	----	----	----	2.50 U	7.41	----	----	0.00200 U	0.00500 U	0.0242 J+	0.00100 U	0.00100 U	0.00994	0.00104	2.50 U	0.00100 U	0.139	0.000200 U	0.239	0.788 U	0.0128	0.00100 U
		10/24/2018	N	3.60	675	328	1.00 U	7.25	3450	7800 J+	----	----	0.0139	----	----	0.00765	0.00100 U	1.00 U	----	0.116	----	0.226	----	0.0127	----
	MW-49B	7/27/2017	N	0.10 U	94	19	0.50 U	11.40	180	490	0.0020 U	0.0050 U	0.092	0.0010 U	0.0010 U	0.023	0.0010 U	0.50 U	0.0010 U	0.029	0.00020 U	0.0093	0.487 U	0.0050 U	0.0010 U
		8/25/2017	N	0.10 U	110	32	0.50 U	10.14	380	620	0.0020 U	0.0050 U	0.140	0.0010 U	0.0010 U	0.012	0.0010 U	0.50 U	0.0010 U	0.031	0.00020 U	0.0053	1.070	0.0050 U	0.0010 U
		8/31/2017	N	0.10 U	98	33	0.50 U	9.57	390	650	0.0020 U	0.0050 U	0.120	0.0010 U	0.0010 U	0.0087	0.0010 U	0.50 U	0.0010 U	0.038	0.00020 U	0.0055	0.616 U	0.0050 U	0.0010 U
		9/6/2017	N	0.11	100	32 J	0.53	9.70	390	730	0.0020 U	0.0050 U	0.120	0.0010 U	0.0010 U	0.0057	0.0010 U	0.53	0.0010 U	0.034	0.00020 U	0.0057	0.509 U	0.0050 U	0.0010 U
		9/14/2017	N	0.12	95	34	0.59	8.80	400	750	0.0020 U	0.0050 U	0.130	0.0010 U	0.0010 U	0.0031	0.0010 U	0.59	0.0010 U	0.043	0.00020 U	0.0051	0.432 U	0.0050 U	0.0010 U
		9/19/2017	N	0.12	94	34	0.50 U	8.49	400	820	0.0020 U	0.0050 U	0.140	0.0010 U	0.0010 U	0.0028	0.0010 U	0.50 U	0.0010 U	0.043	0.00020 U	0.0050	0.481 U	0.0050 U	0.0010 U
		9/27/2017	N	0.12	100	33	0.84	8.93	400	820	0.0020 U	0.0050 U	0.140	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.84	0.0010 U	0.041	0.00020 U	0.0052	0.548 U	0.0050 U	0.0010 U
		10/3/2017	FD	0.12	110	32	0.69	8.76	390	830	0.0020 U	0.0050 UJ	0.120	0.0010 U	0.0010 U	0.002 U	0.0010 UJ	0.69	0.0010 U	0.042	0.00020 U	0.0049	1.970 UJ	0.0050 U	0.0010 U
		10/3/2017	N	0.12	100	32	0.69	8.76	390	830	0.0020 U	0.0050 UJ	0.120	0.0010 U	0.0010 U	0.002 U	0.0010 UJ	0.69	0.0010 U	0.039	0.00020 U	0.0043	0.573 UJ	0.0050 U	0.0010 U
		6/27/2018	N	----	----	----	0.608 J+	7.68	----	----	0.00200 U	0.00500 U	0.109 J+	0.00100 U	0.00100 U	0.00200 U	0.00100 U	0.608 J+	0.00100 U	0.0444	0.000200 U	0.00381	0.780 U	0.00500 U	0.00100 U
		10/24/2018	N	0.173	125	34.8	0.588	7.75	407	965 J+	----	----	0.100	----	----	0.00200 U	0.00100 U	0.588	----	0.0396	----	0.00448	----	0.00500	----

Notes:
U - undetected at the reporting limit/concentration
J - estimated concentration
J+ - estimated concentration, high bias indicated
FD - field duplicate
N - primary sample
MW ID - monitoring well identifier

Table 4 Groundwater Analytical Data - Bottom Ash Pond 2, Bottom Ash Pond 3, Ash Landfill

				Appendix III Constituents							Appendix IV Constituents														
		Analyte Name		Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226/228	Selenium	Thallium
			Unit	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	mg/L	mg/L
Relative Location	MW ID	Date	Type																						
Background	MW-32B	9/1/2016	N	0.27	200	83	0.54	7.21	820	1700	0.0020 U	0.0050 U	0.077	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.54	0.0010 U	0.074	0.00020 U	0.018	1.20	0.0050 U	0.0010 U
		11/11/2016	N	0.28	210	83	0.60	6.37	820	1700	0.0020 U	0.0050 U	0.057	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.60	0.0010 U	0.080	0.00020 U	0.0076	0.716	0.0050 U	0.0010 U
		12/15/2016	N	0.27	190	84	0.59	6.67	830	1700	0.0020 U	0.0050 U	0.053	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.59	0.0010 U	0.073	0.00020 U	0.0064	0.471	0.0050 U	0.0010 U
		2/13/2017	N	0.28	200	84	0.63	7.19	830	1700	0.0020 U	0.0050 U	0.047	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.63	0.0010 U	0.075	0.00020 U	0.0061	0.713	0.0050 U	0.0010 U
		4/4/2017	N	0.31	190	83	0.59	7.23	830	1700	0.020 U	0.050 U	0.038	0.010 U	0.010 U	0.02 U	0.010 U	0.59	0.0100 U	0.081	0.00020 U	0.020 U	0.375	0.050 U	0.010 U
		5/16/2017	N	0.29	180	84	0.60	7.29	830	1700	0.0020 U	0.0050 U	0.040 J	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.60	0.0010 U	0.069	0.00020 U	0.0085	0.752	0.0050 U	0.0010 U
		6/13/2017	N	0.28	190	84	0.64	7.28	840	1800	0.0020 U	0.0050 U	0.041	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.64	0.0010 U	0.081	0.00020 U	0.0079	0.793	0.0050 U	0.0010 U
		7/26/2017	N	0.26	190	86	0.53	7.37	790	1700	0.0020 U	0.0050 U	0.044	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.53	0.0010 U	0.072	0.00020 U	0.0095	0.915 U	0.0050 U	0.0010 U
		4/3/2018	FD	----	----	----	----	----	----	----	0.0020 U	0.0050 U	0.0410 J+	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.595	0.0010 U	0.0811	0.000200 U	0.00540	0.554 J	0.0050 U	0.0010 U
		4/3/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 U	0.0387 J+	0.00100 U	0.00100 U	0.00200 U	0.00100 U	0.639	0.00100 U	0.0804	0.000200 U	0.00502	0.983 J	0.0050 U	0.00100 U
		6/27/2018	N	0.294	189	85.6 J+	0.657 J+	7.35	845	1780	0.00200 U	0.00500 U	0.0371 J+	0.00100 U	0.00100 U	0.00200 U	----	0.657	0.00100 U	0.0769	0.000200 U	0.00568	0.687 U	0.00500 U	0.00100 U
	MW-39B	9/2/2016	N	0.17	170	43	0.79	7.31	450	400 J	0.0020 U	0.0057	0.11	0.0010 U	0.0010 U	0.002 U	0.0028	0.79	0.0010 U	0.073	0.00020 U	0.069	0.823	0.0050 U	0.0010 U
		11/10/2016	N	0.19	190	45	0.65	7.11	530	970	0.0020 U	0.0050 U	0.073	0.0010 U	0.0010 U	0.002 U	0.0015	0.65	0.0010 U	0.069	0.00020 U	0.039	0.926	0.0050 U	0.0010 U
		12/14/2016	N	0.18	180	46	0.63	7.78	540	1300	0.0020 U	0.0050 U	0.064	0.0010 U	0.0010 U	0.002 U	0.0012	0.63	0.0010 U	0.066	0.00020 U	0.028	0.797	0.0050 U	0.0010 U
		2/13/2017	N	0.19	200	46	0.66	7.02	540	1200	0.0020 U	0.0050 U	0.069	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.66	0.0010 U	0.068	0.00020 U	0.020	0.609	0.0050 U	0.0010 U
		4/4/2017	N	0.20	180	46	0.61	7.13	550	1300	0.020 U	0.050 U	0.048	0.010 U	0.010 U	0.02 U	0.010 U	0.61	0.0100 U	0.069	0.00020 U	0.020 U	0.556	0.050 U	0.010 U
		5/16/2017	N	0.21	170	46	0.66	7.17	540	1300	0.0020 U	0.0050 U	0.051 J	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.66	0.0010 U	0.062	0.00020 U	0.017	0.373 U	0.0050 U	0.0010 U
		6/13/2017	N	0.18	170	46	0.66	7.18	550	1300	0.0020 U	0.0050 U	0.046	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.66	0.0010 U	0.064	0.00020 U	0.016	0.671	0.0050 U	0.0010 U
		7/26/2017	N	0.18	180	47	0.64	7.33	540	1300	0.0020 U	0.0050 U	0.050	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.64	0.0010 U	0.063	0.00020 U	0.017	0.426 U	0.0050 U	0.0010 U
		4/3/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 U	0.0472 J+	0.00100 U	0.00100 U	0.00200 U	0.00100 U	0.641	0.00100 U	0.0661	0.000200 U	0.013	0.758 J	0.0050 U	0.00100 U
		6/27/2018	N	0.192	181	46.4 J+	0.686 J+	7.38	582	1350	0.00200 U	0.00500 U	0.0404 J+	0.00100 U	0.00100 U	0.00200 U	----	0.686	0.00100 U	0.0608	0.000200 U	0.0134	0.806 U	0.00500 U	0.00100 U
Downgradient	MW-14BR	11/10/2016	N	0.16	150	61	0.51	7.27	290	770	0.0020 U	0.0050 U	0.047	0.0010 U	0.0010 U	0.011	0.0010 U	0.51	0.0028	0.032	0.00020 U	0.0063	0.550 U	0.0063	0.0010 U
		12/15/2016	N	0.16	150	65	0.50 U	7.81	310	790	0.0020 U	0.0050 U	0.045	0.0010 U	0.0010 U	0.012	0.0010 U	0.50 U	0.0010 U	0.030	0.00020 U	0.0066	0.403 U	0.0068	0.0010 U
		2/14/2017	FD	0.16	150	62	0.54	7.77	310	800	0.0020 U	0.0050 U	0.049	0.0010 U	0.0010 U	0.0096	0.0010 U	0.54	0.0010 U	0.031	0.00020 U	0.0062	0.349 U	0.0062	0.0010 U
		2/14/2017	N	0.16	150	65	0.52	7.77	310	810	0.0020 U	0.0050 U	0.049	0.0010 U	0.0010 U	0.011	0.0010 U	0.52	0.0010 U	0.033	0.00020 U	0.0062	0.318 U	0.0066	0.0010 U
		4/4/2017	N	0.16	140	63	0.50 U	7.62	310	770	0.0200 U	0.0500 U	0.037	0.0100 U	0.0100 U	0.0200 U	0.0100 U	0.50 U	0.0100 U	0.032	0.00020 U	0.0200 U	0.294 U	0.0500 U	0.0100 U
		4/25/2017	N	0.16	140	64	0.50	7.74	310	800	0.0020	0.0050	0.038	0.0050	0.0010	0.011	0.0010	0.50	0.0010	0.030	0.00020	0.0066	0.36	0.0066	0.0010
		5/16/2017	N	0.17	140	66	0.50 U	7.71	310	810	0.0020 U	0.0050 U	0.054 J	0.0010 U	0.0010 U	0.014	0.0010 U	0.50 U	0.0015	0.032	0.00020 U	0.0071	0.638 U	0.0076	0.0010 U
		6/14/2017	N	0.15	150	69	0.50 U	7.65	310	820	0.0020 U	0.0050 U	0.038	0.0010 U	0.0010 U	0.013	0.0010 U	0.50 U	0.0010 U	0.033	0.00020 U	0.0067	0.339 U	0.0066	0.0010 U
		7/26/2017	N	0.15	150	64	0.50 U	7.75	310	800	0.0020 U	0.0050 U	0.047	0.0010 U	0.0010 U	0.011	0.0010 U	0.50 U	0.0010 U	0.027	0.00020 U	0.0064	0.319 U	0.0063	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 U	0.0453 J+	0.00100 U	0.00100 U	0.0120	0.00100 U	0.500 U	0.00100 U	0.0332	0.000200 U	0.0073	0.319 UJ	0.00687	0.00100 U
		6/27/2018	N	0.151	155	73.8 J+	0.500 U	7.15	342	859	----	----	0.0423 J+	----	----	0.0141	----	0.500 U	----	0.0295	----	0.00768	0.328 U	0.00725	----
	MW-20B	11/11/2016	N	0.22	150	46	0.79	6.49	410	930	0.0020 U	0.0050 U	0.060	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.79	0.0010 U	0.039	0.00020 U	0.0074	0.818	0.0050 U	0.0010 U
		12/15/2016	N	0.22	140	46	0.75	7.94	410	960	0.0020 U	0.0050 U	0.063	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.75	0.0010 U	0.039	0.00020 U	0.0078	0.517 U	0.0050 U	0.0010 U
		2/14/2017	N	0.24	150	47	0.80	7.84	410	950	0.0020 U	0.0050 U	0.061	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.8	0.0010 U	0.035	0.00020 U	0.0081	0.401 U	0.0050 U	0.0010 U
		4/3/2017	N	0.24	140	47	0.79	7.70	420	960	0.0200 U	0.0500 U	0.054	0.0100 U	0.0100 U	0.02 U	0.0100 U	0.79	0.0100 U	0.038	0.00020 U	0.0200 U	0.395 U	0.0500 U	0.0100 U
		4/25/2017	FD	0.22	140	48	0.78	7.67	410	960	0.0020	0.0250	0.058	0.0050	0.0010	0.002	0.0010	0.78	0.0010	0.034	0.00020	0.0081	0.377	0.0250	0.0010
		4/25/2017	N	0.22	140	48	0.80	7.67	420	960	0.0020	0.0050	0.055	0.0050	0.0010	0.002	0.0010	0.8	0.0010	0.030	0.00020	0.0074	0.342	0.0050	0.0010
		5/16/2017	N	0.22	130	46	0.76	7.70	400	950	0.0020 U	0.0050 U	0.063 J	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.76	0.0010 U	0.031	0.00020 U	0.0079	0.387 U	0.0050 U	0.0010 U
		6/14/2017	N	0.22	140	47	0.78	7.61	420	980	0.0020 U	0.0050 U	0.056	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.78	0.0010 U	0.041	0.00020 U	0.0082	0.308 U	0.0050 U	0.0010 U
		7/26/2017	N	0.22	140	48	0.73	7.77	410	960	0.0020 U	0.0050 U	0.061	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.73	0.0010 U	0.035	0.00020 U	0.0075	0.358 U	0.0050 U	0.0010 U
		4/3/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 U	0.0596 J+	0.00100 U	0.00100 U	0.0020 U	0.00100 U	0.816	0.00100 U	0.0389	0.000200 U	0.0078	0.358 UJ	0.0050 U	0.00100 U
		6/26/2018	N	0.228	146	47.5 J+	0.835 J+	7.32	433	994	----	----	0.0575 J+	----	----	0.0020 U	----	0.835	----	0.0351	----	0.00834	0.333 U	0.00500 U	----
	MW-36B	9/1/2016	N	0.10 U	150	44	0.65	7.50	380	870	0.0020 U	0.0050 U	0.078	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.65	0.0010 U	0.034	0.00020 U	0.0460	1.340	0.0050 U	0.0010 U
		11/11/2016	N	0.10 U	150	45	0.69	6.67	370	900	0.0020 U	0.0050 U	0.068	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.69	0.0010 U	0.034	0.00020 U	0.0290	0.743	0.0050	0.0010 U
		12/15/2016	FD	0.10 U	140	45	0.67	7.50	390	900	0.0020 U	0.0050 U	0.067	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.67	0.0010 U	0.029	0.00020 U	0.0230	0.713	0.0053	0.0010 U
		12/15/2016	N	0.10 U	140	45	0.66	7.50	390	910	0.0020 U	0.0050 U	0.068	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.66	0.0010 U	0.033	0.00020 U	0.0230	0.798	0.0050 U	0.0010 U
		2/13/2017	N	0.10 U	140	45	0.70	7.48	390	860	0.0020 U	0.0050 U	0.068	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.70	0.0010 U	0.035	0.00020 U	0.0170	0.562	0.0050 U	0.0010 U
		4/4/2017	N	0.10 U	130	45	0.66	7.45	390	890	0.0200 U	0.0500 U	0.065	0.0100 U	0.0100 U	0.02 U	0.0100 U	0.66	0.0100 U	0.035	0.00020 U	0.0200 U	0.540	0.0500 U	0.0100 U
		5/16/2017	N	0.11	130	44	0.67	7.60	390	930	0.0020 U	0.0050 U	0.066 J	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.67	0.0010 U	0.029	0.00020 U	0.0100	0.716	0.0050 U	0.0010 U
		6/13/2017	N	0.10 U	130	45	0.69	7.52	390	920	0.0020 U	0.0050 U	0.059	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.69	0.0010 U	0.034	0.00020 U	0.0092	0.375 U	0.0050 U	0.0010 U
		7/26/2017	N	0.10 U	130	46	0.63	7.70	380	890	0.0020 U	0.0050 U	0.067	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.63	0.0010 U	0.029	0.00020 U	0.0095	0.682 U	0.0053	0.0010 U
		4/3/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 U	0.0616 J+	0.00100 U	0.00100 U	0.0020 U	0.00100 U	0.660	0.00100 U	0.0351	0.000200 U	0.00709	0.727 J	0.00530	0.00100 U
		6/27/2018	N	0.100 U	135	43.5 J+	0.701 J+	6.91	428	930	----	----	0.0596 J+	----	----	0.00200 U	----	0.701	----	0.0289	----	0.00702	0.757 U	0.00500 U	----
	MW-37B	9/1/2016	FD	0.13	230	190	0.55	7.42	480	1200 J	0.0020 U	0.0050 U	0.12	0.0010 U	0.0010 U	0.002 U	0.0013	0.55	0.0010 U	0.046	0.00020 U	0.0720	0.578	0.017	0.0010 U
		9/1/2016	N	0.13	220	190	0.56	7.42	480	1200 J	0.0020 U	0.0050 U	0.11	0.0010 U	0.0010 U	0.002 U	0.0014	0.56	0.0010 U	0.046	0.00020 U	0.0720	0.664	0.017	0.0010 U
		11/11/2016	FD	0.14	230	190	0.55	6.63	490	1200 J	0.0020 U	0.0050 U	0.11	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.55	0.0010 U	0.046	0.00020 U	0.0470	0.432	0.017	0.0010 U
		11/11/2016	N	0.14	230	190	0.55	6.63	490	1200 J	0.0020 U	0.0050 U	0.100	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.55	0.0010 U	0.046	0.00020 U	0.0470	0.582	0.016	0.0010 U
		12/15/2016	N	0.14	230	190	0.55	7.49	510	1300	0.0020 U	0.0050 U	0.100	0.0010 U	0.0010 U	0.004	0.0010 U	0.55	0.0010 U	0.044	0.00020 U	0.0460	0.377 U	0.018	0.0010 U
		2/13/2017	N	0.14	240	190	0.57	7.38	510	1300	0.0020 U	0.0050 U	0.095	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.57	0.0010 U	0.042	0.00020 U	0.0450	0.342 U	0.017	0.0010 U
		4/4/2017	FD	0.15	210	190	0.53	7.40	510	1300 J	0.0200 U	0.0500 U	0.090	0.0100 U	0.0100 U	0.02 U	0.0100 U	0.53	0.0100 U	0.043	0.00020 U	0.0480	0.390	0.0500 U	0.0100 U
		4/4/2017	N	0.16	230	190	0.52	7.40	520	1300 J	0.0200 U	0.0500 U	0.093	0.0100 U	0.0100 U	0.02 U	0.0100 U	0.52	0.0100 U	0.047	0.00020 U	0.0480	0.322 U	0.0500 U	0.0100 U
		5/16/2017	N	0.16	210	190	0.56	7.50	520	1400	0.0020 U	0.0050 U	0.094 J	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.56	0.0010 U	0.038	0.00020 U	0.0540	0.352 U	0.017	0.0010 U
		6/13/2017	FD	0.14	220	180	0.52	7.47	520	1400	0.0020 U	0.0050 U	0.088	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.52	0.0010 U	0.045	0.00020 U	0.0510	0.44	0.016	0.0010 U
		6/13/2017	N	0.14	210	180	0.57	7.47	530	1400	0.0020 U	0.0050 U	0.087	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.57	0.0010 U	0.046	0.00020 U	0.0520	0.327 U	0.016	0.0010 U
		7/26/2017	N	0.14	230	180	0.52	7.57	520	1400	0.0020 U	0.0050 U	0.092	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.52	0.0010 U	0.04	0.00020 U	0.0530	0.36 U	0.015	0.0010 U
		4/3/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 U	0.0834 J+	0.00100 U	0.00100 U	0.0020 U	0.00100 U	0.583	0.00100 U	0.0433	0.000200 U	0.0601	0.36 UJ	0.0111	0.00100 U
		6/26/2018	FD	0.159	223	133 J+	0.613	7.33	573	1280 J	----	----	0.0786 J+	----	----	0.00200 U	----	0.613	----	0.0432	----	0.0566	0.401 U	0.0102	----
		6/26/2018	N	0.155	217	124 J+	2.50 U	7.33	510	1320	----	----	0.0766 J+	----	----	0.00200 U	----	----	----	0.0389	----	0.0549	0.477 U	0.0109	----
	MW-40B	9/2/2016	N	0.15	130	32	0.78	7.32	310	840	0.0020 U	0.0050 U	0.054	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.78	0.0010 U	0.047	0.00020 U	0.0260	0.733	0.0077	0.0010 U
		11/10/2016	N	0.16	150	34	0.84	7.19	340	920	0.0020 U	0.0050 U	0.046	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.84	0.0010 U	0.053	0.00020 U	0.0120	0.651	0.0065	0.0010 U
		12/14/2016	N	0.16	140	35	0.83	7.99	350	910	0.0020 U	0.0050 U	0.047	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.83	0.0010 U	0.049	0.00020 U	0.0140	0.988	0.0076	0.0010 U
		2/14/2017	N	0.16	150	36	0.87	7.49	350	900	0.0020 U	0.0050 U	0.041	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.87	0.0010 U	0.049	0.00020 U	0.0110	0.423	0.01	0.0010 U
		4/4/2017	N	0.17	130	36	0.83	7.61	350	900	0.020 U	0.050 U	0.039	0.010 U	0.010 U	0.020 U	0.010 U	0.83	0.010 U	0.052	0.00020 U	0.020 U	0.410	0.05 U	0.010 U
		5/16/2017	N	0.18	130	36	0.87	7.51	350	960	0.0020 U	0.0050 U	0.040	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.87	0.0010 U	0.046	0.00020 U	0.0140	0.745	0.0092	0.0010 U
		6/14/2017	N	0.15	130	36	0.88	7.45	360	940	0.0020 U	0.0050 U	0.036	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.88	0.0010 U	0.053	0.00020 U	0.0130	0.938	0.0084	0.0010 U
		7/26/2017	N	0.16	150	37	0.83	7.61	350	900	0.0020 U	0.0050 U	0.037	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.83	0.0010 U	0.05	0.00020 U	0.0140	0.862 U	0.0087	0.0010 U
		4/3/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 U	0.0393 J+	0.00100 U	0.00100 U	0.00227	0.00100 U	0.921	0.00100 U	0.0534	0.000200 U	0.0129	0.966 J	0.00903	0.00100 U
		6/27/2018	N	0.166	139	35.2 J+	0.964 J+	7.61	379	942	----	----	0.0326 J+	----	----	0.00200 U	----	0.964	----	0.0492	----	0.00892	1.07 U	0.00840	----
	MW-52B	7/19/2017	N	0.15	120	33	0.50	7.91	370	820	0.0020 U	0.0050 U	0.13	0.0010 U	0.0010 U	0.0058	0.0014	0.50	0.0010 U	0.048	0.00020 U	0.013	0.347 U	0.0050 U	0.0010 U
		8/25/2017	N	0.16	120	41	0.50 U	7.54	410	920	0.0020 U	0.0050 U	0.12	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.0010 U	0.039	0.00020 U	0.0094	0.903	0.0050 U	0.0010 U
		8/31/2017	N	0.16	160	41	0.50 U	7.61	420	930	0.0020 U	0.0050 U	0.24	0.0010 U	0.0010 U	0.0110	0.004	0.50 U	0.0041	0.063	0.00020 U	0.0088	1.25	0.0050 U	0.0010 U
		9/6/2017	N	0.17	140	41 J	0.50 U	7.61	430	980	0.0020 U	0.0050 U	0.11	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.0010 U	0.045	0.00020 U	0.0083	1.20 U	0.0050 U	0.0010 U
		9/14/2017	N	0.16	130	43	0.50 U	7.46	430	940	0.0020 U	0.0050 U	0.12	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.0010 U	0.049	0.00020 U	0.0071	0.482	0.0050 U	0.0010 U
		9/18/2017	N	0.15	130	41	0.50 U	7.45	420	1000	0.0020 U	0.0050 U	0.11	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.0010 U	0.049	0.00020 U	0.0066	0.566	0.0050 U	0.0010 U
		9/27/2017	N	0.15	140	40	0.50 U	7.55	430	960	0.0020 U	0.0050 U	0.11	0.0010 U	0.0010 U	0.0020 U	0.0010	0.50 U	0.0010 U	0.050	0.00020 U	0.0063	0.37 U	0.0050 U	0.0010 U
		10/3/2017	N	0.15	130	42	0.50 U	7.74	430	1000	0.0020 U	0.0050 UJ	0.096	0.0010 U	0.0010 U	0.0020 U	0.0010 UJ	0.50 U	0.0010 U	0.048	0.00020 U	0.0056	0.576 UJ	0.0050 U	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 UJ	0.109 J+	0.00100 U	0.00100 U	0.00200 U	0.00100 U	0.500 U	0.00100 U	0.048	0.000200 U	0.00531	0.617 J	0.00500 U	0.00100 U
		6/27/2018	N	0.160	175	39 J+	0.500 U	7.39	499	1080	0.00200 U	0.00500 U	0.0861 J+	0.00100 U	0.00100 U	0.00200 U	----	0.500 U	0.00100 U	0.0476	0.000200 U	0.00452	0.873 U	0.00500 U	0.00100 U
	MW-53B	7/19/2017	N	0.10 U	95	32	0.96	8.63	220	570	0.0020 U	0.0050 U	0.10	0.0010 U	0.0010 U	0.0045	0.0010 U	0.96	0.0010 U	0.042	0.00020 U	0.014	0.682 U	0.006	0.0010 U
		8/25/2017	N	0.10 U	81	34	0.91	8.48	210	560	0.0020 U	0.0050 U	0.12	0.0010 U	0.0010 U	0.0038	0.0010 U	0.91	0.0010 U	0.033	0.00020 U	0.014	1.09	0.0050 U	0.0010 U
		8/31/2017	N	0.10 U	82	33	0.88	8.72	220	540	0.0020 U	0.0050 U	0.13	0.0010 U	0.0010 U	0.0045	0.0010 U	0.88	0.0010 U	0.042	0.00020 U	0.015	0.426	0.0050 U	0.0010 U
		9/6/2017	N	0.10 U	79	33 J	1.00	8.98	210	560	0.0020 U	0.0050 U	0.13	0.0010 U	0.0010 U	0.0052	0.0010 U	1.0	0.0010 U	0.035	0.00020 U	0.015	0.407 U	0.0050 U	0.0010 U
		9/14/2017	N	0.10 U	77	33	0.93	7.79	220	590	0.0020 U	0.0050 U	0.094	0.0010 U	0.0010 U	0.0028	0.0010 U	0.93	0.0010 U	0.038	0.00020 U	0.012	0.424 U	0.0050 U	0.0010 U
		9/18/2017	N	0.10 U	76	33	1.00	7.52	210	580	0.0020 U	0.0050 U	0.094	0.0010 U	0.0010 U	0.0033	0.0010 U	1.0	0.0010 U	0.041	0.00020 U	0.012	0.432 U	0.0050 U	0.0010 U
		9/27/2017	N	0.10 U	78	32	1.10	7.96	220	620	0.0020 U	0.0050 U	0.070	0.0010 U	0.0010 U	0.002 U	0.0010 U	1.1	0.0010 U	0.042	0.00020 U	0.010	0.375 U	0.0050 U	0.0010 U
		10/3/2017	N	0.10 U	78	33	1.10	7.79	220	610	0.0020 U	0.0050 UJ	0.081	0.0010 U	0.0010 U	0.0022	0.0010 UJ	1.1	0.0010 U	0.040	0.00020 U	0.011	1.88 UJ	0.0050 U	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 UJ	0.0546 J+	0.00100 U	0.00100 U	0.00220	0.00100 UJ	1.14	0.00100 U	0.042	0.000200 U	0.00696	1.88 UJ	0.00689	0.00100 U
		6/27/2018	N	0.104	102	36.6 J+	1.33 J+	7.62	242	691	0.00200 U	0.00500 UJ	0.0522 J+	0.00100 U	0.00100 U	0.00200 U	----	1.33	0.00100 U	0.0384	0.000200 U	0.00851	0.400 U	0.00636	0.00100 U

Notes:
U - undetected at the reporting limit/concentration
J+ - estimated concentration, high bias indicated
UJ/J - estimated concentration
FD - field duplicate
N - primary sample
MW ID - monitoring well identifier
mg/L - milligram per liter

Table 5 Groundwater Analytical Data - Emergency Holding Ponds

				Appendix III Constituents							Appendix IV Constituents														
		Analyte Name		Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Radium 226/228	Selenium	Thallium
			Unit	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	mg/L	mg/L
Relative Location	MW ID	Date	Type																						
Background	MW-41B	8/31/2016	N	0.61	240	160	0.50 U	7.41	1300	2300	0.0020 U	0.0050 U	0.069	0.0010 U	0.0010 U	0.002 U	0.0016	0.50 U	0.0010 U	0.050	0.00020 U	0.037	1.02	0.0097	0.0010 U
		11/11/2016	N	0.68	270	170	0.50 U	6.45	1800	2400	0.0020 U	0.0050 U	0.050	0.0010 U	0.0010 U	0.0039	0.0010 U	0.50 U	0.0010 U	0.057	0.00020 U	0.048	0.807	0.010	0.0010 U
		12/15/2016	N	0.66	260	180	0.50 U	7.70	1500	2500	0.0020 U	0.0050 U	0.045	0.0010 U	0.0010 U	0.0042	0.0010 U	0.50 U	0.0010 U	0.053	0.00020 U	0.045	0.938	0.011	0.0010 U
		2/14/2017	N	0.64	280	180	0.50 U	7.53	1500	2600	0.0020 U	0.0050 U	0.046	0.0010 U	0.0010 U	0.0051	0.0010 U	0.50 U	0.0010 U	0.055	0.00020 U	0.055	0.358 U	0.011	0.0010 U
		4/3/2017	N	0.70	270	180	0.50 U	7.43	5.0 U	2700	0.020 U	0.050 U	0.036	0.010 U	0.010 U	0.02 U	0.010 U	0.50 U	0.0100 U	0.062	0.00020 U	0.053	0.408	0.050 U	0.010 U
		5/16/2017	N	0.66	270	190	0.50 U	7.48	1600	2800	0.0020 U	0.0050 U	0.037 J	0.0010 U	0.0010 U	0.0048	0.0010 U	0.50 U	0.0010 U	0.054	0.00020 U	0.060	0.373	0.012	0.0010 U
		6/13/2017	N	0.60	270	190	0.50 U	7.47	1600	2800	0.0020 U	0.0050 U	0.032	0.0010 U	0.0010 U	0.0042	0.0010 U	0.50 U	0.0010 U	0.058	0.00020 U	0.056	0.538	0.011	0.0010 U
		7/26/2017	N	0.64	280	200	0.50 U	7.56	1500	2700	0.0020 U	0.0050 U	0.034	0.0010 U	0.0010 U	0.004	0.0010 U	0.50 U	0.0010 U	0.054	0.00020 U	0.054	0.609 U	0.011	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.00200 U	0.00500 U	0.0334 J+	0.00100 U	0.00100 U	0.00336	0.00100 U		0.00100 U	0.0655	0.000200 U	0.0637	0.609 UJ	0.00886	0.00100 UJ
		6/26/2018	N	0.703	351	225 J+	0.500 U	7.44	1660	3050	----	----	0.0351 J+	----	----	0.00335	----	0.500 U	----	0.0631	----	0.0678	0.730 U	0.00832	----
	MW-42B	8/31/2016	N	0.94	530	320	0.50 U	7.40	2200	3800	0.0020 U	0.0050 U	0.061	0.0010 U	0.0010 U	0.002 U	0.0012	0.50 U	0.0010 U	0.085	0.00020 U	0.18	0.535	0.0050 U	0.0010 U
		11/11/2016	N	0.92	330	230	0.68	6.52	1700	2800	0.0020 U	0.0050 U	0.047	0.0010 U	0.0010 U	0.0024	0.0010 U	0.68	0.0010 U	0.066	0.00020 U	0.15	0.488 U	0.0050 U	0.0010 U
		12/14/2016	N	0.89	320	210	0.69	7.85	1600	2700	0.0020 U	0.0050 U	0.046	0.0010 U	0.0010 U	0.0029	0.0010 U	0.69	0.0010 U	0.061	0.00020 U	0.13	0.590	0.0050 U	0.0010 U
		2/15/2017	N	0.91	340	220	0.70	7.47	1600	2900	0.0020 U	0.0050 U	0.046	0.0010 U	0.0010 U	0.0036	0.0010 U	0.70	0.0010 U	0.063	0.00020 U	0.15	0.509 U	0.0050 U	0.0010 U
		4/3/2017	N	0.94	450	320	0.50 U	7.47	5.0 U	3900	0.020 U	0.050 U	0.030	0.010 U	0.010 U	0.02 U	0.010 U	0.50 U	0.0100 U	0.083	0.00020 U	0.17	0.477	0.050 U	0.010 U
		5/17/2017	N	0.87	430	320	0.50 U	7.47	2200	3900	0.0020 U	0.0050 U	0.032 J	0.0010 U	0.0010 U	0.0027	0.0010 U	0.50 U	0.0010 U	0.075	0.00020 U	0.18	0.397	0.0065	0.0010 U
		6/13/2017	N	0.82	450	310	0.50 U	7.48	2200	4000	0.0020 U	0.0050 U	0.030	0.0010 U	0.0010 U	0.0024	0.0010 U	0.50 U	0.0010 U	0.081	0.00020 U	0.17	0.609	0.0050 U	0.0010 U
		7/27/2017	N	1.00	410	300	0.50 U	7.40	1900	3400	0.0020 U	0.0050 U	0.027	0.0010 U	0.0010 U	0.0025	0.0010 U	0.50 U	0.0010 U	0.071	0.00020 U	0.15	0.503 U	0.0055	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.0020 U	0.0050 U	0.027 J+	0.0010 U	0.00100 U	0.00319	0.00100 U		0.00100 U	0.0684	0.00020 U	0.12100	0.508 J	0.00770	0.00100 U
		6/26/2018	N	1.07	384	245 J+	0.532 J+	7.37	1760	3170	----	----	0.0252 J+	----	----	0.00217	----	0.532 J+	----	0.0708	----	0.143	0.472 U	0.00714	----
	MW-43B	9/1/2016	N	0.33	180	69	0.50 U	7.19	660	1300	0.0020 U	0.0050 U	0.056	0.0010 U	0.0010 U	0.003	0.0010 U	0.50 U	0.0010 U	0.041	0.00020 U	0.049	0.525	0.0050 U	0.0010 U
		11/11/2016	N	0.35	140	42	0.50 U	6.49	470	1000	0.0020 U	0.0050 U	0.038	0.0010 U	0.0010 U	0.008	0.0010 U	0.50 U	0.0010 U	0.040	0.00020 U	0.048	0.722	0.0050 U	0.0010 U
		12/14/2016	N	0.34	120	40	0.50 U	7.62	450	970	0.0020 U	0.0050 U	0.034	0.0010 U	0.0010 U	0.0089	0.0010 U	0.50 U	0.0010 U	0.038	0.00020 U	0.043	0.714 U	0.0050 U	0.0010 U
		2/15/2017	N	0.35	120	39	0.50 U	7.37	410	910	0.0020 U	0.0050 U	0.034	0.0010 U	0.0010 U	0.0076	0.0010	0.50 U	0.0010 U	0.035	0.00020 U	0.039	0.460 U	0.0050 U	0.0010 U
		4/4/2017	N	0.35	100	42	0.50 U	7.42	400	890	0.020 U	0.050 U	0.033	0.010 U	0.010 U	0.02 U	0.010 U	0.50 U	0.0100 U	0.035	0.00020 U	0.032	0.316 U	0.050 U	0.010 U
		5/17/2017	N	0.36	110	47	0.50 U	7.50	420	910	0.0020 U	0.0050 U	0.031 J	0.0010 U	0.0010 U	0.003	0.0010 U	0.50 U	0.0010 U	0.031	0.00020 U	0.034	0.315 U	0.0050 U	0.0010 U
		6/13/2017	N	0.32	100	48	0.50 U		420	930	0.0020 U	0.0050 U	0.029	0.0010 U	0.0010 U	0.0024	0.0010 U	0.50 U	0.0010 U	0.037	0.00020 U	0.031	0.640	0.0050 U	0.0010 U
		7/26/2017	N	0.34	110	50	0.50 U	7.56	430	930	0.0020 U	0.0050 U	0.030	0.0010 U	0.0010 U	0.004	0.0010 U	0.50 U	0.0010 U	0.033	0.00020 U	0.030	0.384 U	0.0050 U	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.0020 U	0.0050 U	0.038 J+	0.0010 U	0.00100 U	0.00246	0.00100 U		0.00100 U	0.0399	0.00020 U	0.03660	0.384 UJ	0.00500 U	0.00100 UJ
		6/26/2018	N	0.366	118	47.2 J+	0.500 U	7.16	423	996	----	----	0.0309 J+	----	----	0.00218	----	0.500 U	----	0.0305	----	0.0346	0.322 U	0.00500 U	----
Downgradient	MW-44B	8/31/2016	N	0.11	150	53	0.82	7.61	340	870	0.0020 U	0.0050 U	0.069	0.0010 U	0.0010 U	0.002	0.0010 U	0.82	0.0010 U	0.042	0.00020 U	0.031	0.942	0.0050 U	0.0010 U
		11/12/2016	N	0.11	160	58	0.86	6.92	380	970	0.0020 U	0.0050 U	0.068	0.0050 U	0.0010 U	0.0079	0.0010 U	0.86	0.0010 U	0.035	0.00020 U	0.0067	0.783	0.0050 U	0.0010 U
		12/14/2016	N	0.11	160	58	0.85	8.11	390	980	0.0020 U	0.0050 U	0.071	0.0010 U	0.0010 U	0.0088	0.0010 U	0.85	0.0010 U	0.032	0.00020 U	0.0066	0.480 U	0.0055	0.0010 U
		2/15/2017	N	0.10	160	58	0.83	7.60	380	980	0.0020 U	0.0050 U	0.070	0.0010 U	0.0010 U	0.0087	0.0010 U	0.83	0.0010 U	0.032	0.00020 U	0.0065	0.444 U	0.0050	0.0010 U
		4/3/2017	N	0.11	150	59	0.79	7.60	390	980	0.020 U	0.050 U	0.065	0.010 U	0.010 U	0.02 U	0.010 U	0.79	0.0100 U	0.036	0.00020 U	0.020 U	0.484	0.050 U	0.010 U
		5/17/2017	N	0.11	150	60	0.78	7.62	400	990	0.0020 U	0.0050 U	0.062 J	0.0010 U	0.0010 U	0.0082	0.0010 U	0.78	0.0010 U	0.033	0.00020 U	0.0064	0.439	0.0058	0.0010 U
		6/13/2017	N	0.10 U	150	59	0.79	7.57	400	1000	0.0020 U	0.0050 U	0.059	0.0010 U	0.0010 U	0.0079	0.0010 U	0.79	0.0010 U	0.034	0.00020 U	0.0062	0.858	0.0050 U	0.0010 U
		7/27/2017	N	0.10	160	61	0.87	7.49	410	1000	0.0020 U	0.0050 U	0.067	0.0010 U	0.0010 U	0.0064	0.0010 U	0.87	0.0010 U	0.031	0.00020 U	0.0066	0.655 U	0.0084	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.0020 U	0.0050 U	0.063 J+	0.0010 U	0.00100 U	0.00782	0.00100 U		0.00100 U	0.0358	0.00020 U	0.00692	0.559 J	0.00583	0.00100 U
		6/26/2018	N	0.103	168	56.4 J+	0.787 J+	7.13	382	1030	----	----	0.0571 J+	----	----	0.00830	----	0.787 J+	----	0.0313	----	0.00645	0.831 U	0.00590	----
	MW-45B	8/31/2016	N	0.18	150	44	0.82	7.61	300	1000 J	0.0020 U	0.0050 U	0.063	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.82	0.0010 U	0.038	0.00020 U	0.026	0.635	0.0086	0.0010 U
		11/12/2016	N	0.18	150	45	0.9	6.59	320	830	0.0020 U	0.0050 U	0.061	0.0050 U	0.0010 U	0.002 U	0.0010 U	0.9	0.0010 U	0.035	0.00020 U	0.013	0.738	0.0074	0.0010 U
		12/14/2016	N	0.17	130	46	0.91	8.13	320	840	0.0020 U	0.0050 U	0.058	0.0010 U	0.0010 U	0.0026	0.0010 U	0.91	0.0010 U	0.029	0.00020 U	0.011	0.680	0.0091	0.0010 U
		2/14/2017	N	0.19	150	45	0.91	7.72	320	820	0.0020 U	0.0050 U	0.052	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.91	0.0010 U	0.034	0.00020 U	0.0088	0.465 U	0.0088	0.0010 U
		4/3/2017	N	0.19	130	46	0.87	7.75	320	850	0.020 U	0.050 U	0.048	0.010 U	0.010 U	0.02 U	0.010 U	0.87	0.0100 U	0.034	0.00020 U	0.020 U	0.488	0.050 U	0.010 U
		5/17/2017	N	0.18	130	47	0.9	7.74	330	840	0.0020 U	0.0050 U	0.056 J	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.9	0.0010 U	0.030	0.00020 U	0.0088	0.323 U	0.0099	0.0010 U
		6/13/2017	N	0.16	130	46	0.87	7.72	350	870	0.0020 U	0.0050 U	0.046	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.87	0.0010 U	0.036	0.00020 U	0.0081	0.587	0.0087	0.0010 U
		7/27/2017	N	0.17	140	47	0.94	7.57	330	870	0.0020 U	0.0050 U	0.051	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.94	0.0010 U	0.033	0.00020 U	0.0079	0.390 U	0.0090	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.0020 U	0.0050 U	0.050 J+	0.0010 U	0.00100 U	0.00200 U	0.00100 U		0.00100 U	0.03800	0.000200 U	0.00823	0.390 UJ	0.00988	0.00100 UJ
		6/26/2018	N	0.180	144	43.8 J+	0.892 J+	7.16	307	862	----	----	0.0486 J+	----	----	0.00200 U	----	0.892 J+	----	0.0312	----	0.00786	0.654 U	0.00859	----
	MW-46B	8/31/2016	N	0.10 U	76	19	0.82	7.64	150	480	0.0020 U	0.0050 U	0.059	0.0010 U	0.0010 U	0.002	0.0010 U	0.82	0.0010 U	0.032	0.00020 U	0.014	0.761	0.0050 U	0.0010 U
		11/11/2016	N	0.11	78	19	0.95	6.48	160	500	0.0020 U	0.0050 U	0.049	0.0050 U	0.0010 U	0.002 U	0.0010 U	0.95	0.0010 U	0.026	0.00020 U	0.0059	1.020	0.0050 U	0.0010 U
		12/14/2016	N	0.12	74	19	0.94	8.12	160	510	0.0020 U	0.0050 U	0.049	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.94	0.0010 U	0.025	0.00020 U	0.0051	0.870	0.0050 U	0.0010 U
		2/14/2017	N	0.11	78	20	0.95	7.66	160	500	0.0020 U	0.0050 U	0.049	0.0010 U	0.0010 U	0.0025	0.0010 U	0.95	0.0010 U	0.025	0.00020 U	0.0041	0.577	0.0050 U	0.0010 U
		4/3/2017	N	0.10 U	78	24	0.69	7.61	170	530	0.020 U	0.050 U	0.053	0.010 U	0.010 U	0.02 U	0.010 U	0.69	0.0100 U	0.026	0.00020 U	0.020 U	0.510	0.050 U	0.010 U
		5/17/2017	N	0.10 U	71	25	0.68	7.58	170	540	0.0020 U	0.0050 U	0.060 J	0.0010 U	0.0010 U	0.0074	0.0010 U	0.68	0.0010 U	0.020	0.00020 U	0.0056	0.391	0.0050 U	0.0010 U
		6/13/2017	N	0.10 U	73	24	0.66	7.54	170	550	0.0020 U	0.0050 U	0.052	0.0010 U	0.0010 U	0.0071	0.0010 U	0.66	0.0010 U	0.028	0.00020 U	0.0054	0.530	0.0050 U	0.0010 U
		7/27/2017	N	0.10 U	73	23	0.84	7.44	170	540	0.0020 U	0.0050 U	0.052	0.0010 U	0.0010 U	0.0049	0.0010 U	0.84	0.0010 U	0.021	0.00020 U	0.0044	0.495 U	0.0050 U	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.0020 U	0.0050 U	0.064 J+	0.0010 U	0.00100 U	0.00995	0.00100 U		0.00100 U	0.0273	0.000200 U	0.00530	0.591 J	0.00500 U	0.00100 U
		6/26/2018	N	0.100 U	83.2	25.4 J+	0.677 J+	6.94	175	565	----	----	0.0583 J+	----	----	0.00866	----	0.677 J+	----	0.0201	----	0.00579	0.320 U	0.00500 U	----
	MW-47B	8/31/2016	N	0.13	130	27	0.50 U	7.52	270	730	0.0020 U	0.0050 U	0.085	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.50 U	0.0010 U	0.039	0.00020 U	0.025	0.672	0.0050 U	0.0010 U
		11/11/2016	N	0.13	130	30	0.50 U	6.46	300	710	0.0020 U	0.0050 U	0.097	0.0050 U	0.0010 U	0.0025	0.0010 U	0.50 U	0.0010 U	0.032	0.00020 U	0.013	1.400	0.0050 U	0.0010 U
		12/14/2016	N	0.13	120	30	0.50 U	7.95	310	740	0.0020 U	0.0050 U	0.085	0.0010 U	0.0010 U	0.0032	0.0010 U	0.50 U	0.0010 U	0.027	0.00020 U	0.013	1.640	0.0050 U	0.0010 U
		2/14/2017	N	0.13	130	31	0.50 U	7.51	310	750	0.0020 U	0.0050 U	0.086	0.0010 U	0.0010 U	0.0043	0.0010 U	0.50 U	0.0010 U	0.030	0.00020 U	0.0091	0.423 U	0.0050 U	0.0010 U
		4/3/2017	N	0.14	120	30	0.50 U	7.54	310	740	0.020 U	0.050 U	0.079	0.010 U	0.010 U	0.02 U	0.010 U	0.50 U	0.0100 U	0.029	0.00020 U	0.020 U	0.768	0.050 U	0.010 U
		5/17/2017	N	0.14	120	31	0.50 U	7.54	320	780	0.0020 U	0.0050 U	0.083 J	0.0010 U	0.0010 U	0.0039	0.0010 U	0.50 U	0.0010 U	0.025	0.00020 U	0.0071	0.587	0.0050 U	0.0010 U
		6/12/2017	N	0.12	110	30	0.50 U	7.57	320	790	0.0020 U	0.0050 U	0.074	0.0010 U	0.0010 U	0.0036	0.0010 U	0.50 U	0.0010 U	0.032	0.00020 U	0.0069	0.568	0.0050 U	0.0010 U
		7/27/2017	N	0.12	130	32	0.50 U	7.28	310	780	0.0020 U	0.0050 U	0.079	0.0010 U	0.0010 U	0.0038	0.0010 U	0.50 U	0.0010 U	0.024	0.00020 U	0.0076	0.413 U	0.0050 U	0.0010 U
		4/4/2018	N	----	----	----	----	----	----	----	0.0020 U	0.0050 U	0.0818 J+	0.0010 U	0.00100 U	0.00457	0.00100 U		0.00100 U	0.0313	0.000200 U	0.00693	0.832 J	0.00500 U	0.00100 U
		6/26/2018	N	0.146	136	28.5 J+	0.500 U	6.92	296	789	----	----	0.0817 J+	----	----	0.00457	----	0.500 U	----	0.0282	----	0.00679	0.886 U	0.00500 U	----

Notes:
U - undetected at the reporting limit/concentration
J+ - estimated concentration, high bias indicated
UJ/J - estimated concentration
FD - field duplicate
N - primary sample
MW ID - monitoring well identifier
mg/L - milligram per liter

Table 6 Groundwater Analytical Data - Field Blanks

			Appendix III Constituents						Appendix IV Constituents														
		Analyte Name / Unit	Boron mg/L	Calcium mg/L	Chloride mg/L	Fluoride mg/L	Sulfate mg/L	TDS mg/L	Antimony mg/L	Arsenic mg/L	Barium mg/L	Beryllium mg/L	Cadmium mg/L	Chromium mg/L	Cobalt mg/L	Fluoride mg/L	Lead mg/L	Lithium mg/L	Mercury mg/L	Molybdenum mg/L	Radium 226/228 pCi/L	Selenium mg/L	Thallium mg/L
Sample ID	Date	Type																					
FB-01	9/14/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.404 U	0.0050 U	0.0010 U
FB-01	9/18/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.330 U	0.0050 U	0.0010 U
FB-01	9/27/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.423	0.0050 U	0.0010 U
FB-01	10/3/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.386	0.0050 U	0.0010 U
FB-01-042517	4/25/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.025 U	0.0010 U	0.0050 U	0.0010 U	0.0020 U	0.0010 U	0.001 U	0.001 U	0.020 U	0.00200 U	0.00200 U	0.386 U	0.025 U	0.0010 U
FB-01-061417	6/14/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.343 U	0.0050 U	0.0010 U
FB-01-071917	7/19/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.122 U	0.0050 U	0.0010 U
FB-01-083117	8/31/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.367	0.0050 U	0.0010 U
FB-01-090617	9/6/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.386	0.0050 U	0.0010 U
FB-021417	2/14/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.308 U	0.0050 U	0.0010 U
FB-1	9/1/2016	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.558 U	0.0050 U	0.0010 U
FB-1	5/17/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	13	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.368	0.0050 U	0.0010 U
FB-1	7/26/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.597	0.0050 U	0.0010 U
FB-1-082517	8/25/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.424 U	0.0050 U	0.0010 U
FB-1-121516	12/15/2016	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.361 U	0.0050 U	0.0010 U
FIELD BLANK-1-040417	4/4/2017	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0010 U	0.0010 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.346 U	0.0050 U	0.0010 U
FIELD BLANK-1-111116	11/11/2016	FB	0.10 U	1.0 U	3.0 U	0.50 U	5.0 U	10 U	0.0020 U	0.0050 U	0.0050 U	0.0050 U	0.0010 U	0.0020 U	0.0010 U	0.50 U	0.50 U	0.020 U	0.00020 U	0.00200 U	0.468 U	0.0050 U	0.0010 U
Rinse Blank	4/4/2018	FB	----	----	----	----	----	----	0.00200 U	0.00500 U	0.00500 U	0.00500 U	0.00100 U	0.00200 U	0.00100 U	0.500 U	0.500 U	0.0200 U	0.000200 U	0.00200 U	0.468 U	0.00500 U	0.00100 U
FB-01-062718	6/27/2018	FB	0.100 U	0.200 U	3.00 U	0.500 U	5.00 U	10.0 U	0.00200 U	0.00500 U	0.00500 U	0.00500 U	0.00100 U	0.00200 U	----	0.500 U	0.500 U	0.0200 U	0.000200 U	0.00200 U	0.380	0.00500 U	0.00100 U
FB-01	10/24/2018	FB	0.100 U	0.200 U	3.00 U	0.500 U	5.00 U	1750	----	----	0.00500 U	----	----	0.00200 U	0.00100 U	----	----	0.0200 U	----	0.00200 U	----	0.00500 U	----

Notes:
U - undetected at the reporting limit/concentration
FB - field blank

Appendix I

Groundwater Flow Calculations

Groundwater Velocity Calculations
Laramie River Station
CCR Unit/Multi-Unit

Project:	Laramie River Station	CCR Unit:	Bottom Ash Pond 1	Background Wells:	MW-52B, MW-53B
Calculations by:	Jeremy Hurshman/Chris Ahrendt	Checked by:	Gregg Somermeyer	Downgradient Wells:	MW-49B, MW-21B, MW-38B
Date:	1/17/2019	Date:	1/21/2019		

Hydrualic Gradient (i, ft/ft)

$$i = -{}^{dh}/_{dl}$$

where, i= hydraulic gradient
dh= change in hydraulic head between upgradient and downgradient locations
dl= horizontal distance between upgradient and downgradient locations, parallel to flow (perpendicular to potentiometric contours)

Date	Upgradient WL elevation (ft MSL)	Downgradient WL Elevation (ft MSL)	dh (ft)	dl (ft)	i (ft/ft)
April 3, 2018	4493.56	4485.66	7.90	970	0.0081
June 26, 2018	4494.03	4485.97	8.06	970	0.0083
October 24, 2018	4494.35	4486.98	7.37	970	0.0076
				Minimum	0.0076
				Maximum	0.0083
				Average	0.0080

Hydraulic Conductivity (K, ft/d)

K, from slug and pumping tests		
Minimum	1.04	ft/day
Maximum	1.04	ft/day
Average (geomean)	1.04	ft/day

Specific Yield, Effective Porosity

Specific Yield, Effective Porosity		
Minimum	0.02	
Maximum	0.3	
Average	0.15	

Note: Effective porosity/specific yield is based on literature values from Arikaree Formation literature and textbook values for sandstone

Seepage Velocity

$$v_s = {}^{-K * i}/_{n_e}$$

where, v_s= seepage velocity, feet per day (ft/d)
K= hydraulic conductivity, feet per day (ft/d)
i= hydraulic gradient, feet per foot (ft/ft)
n_e= effective porosity/specific yield, unitless

Calculated Seepage Velocities (ft/day)				
	K (ft/day)	i (ft/ft)	n_e	v_s (ft/day)
Minimum	1.04	0.0076	0.30	0.026
Maximum	1.04	0.0083	0.02	0.432
Average	1.04	0.0080	0.15	0.229

Groundwater Velocity Calculations
Laramie River Station
CCR Unit/Multi-Unit

Project:	Laramie River Station	CCR Unit:	Bottom Ash Ponds 2&3 and Ash Landfill	Background Wells:	MW-39B, MW-32B
Calculations by:	Jeremy Hurshman/Chris Ahrendt	Checked by:	Gregg Somermeyer	Downgradient Wells:	MW-36B, MW-37B, MW-20B, MW-14BR, MW-40B, MW-52B, MW-53B
Date:	1/17/2019	Date:	1/21/2019		

Hydrualic Gradient (i, ft/ft)

$$i = -{dh}/{dl}$$

where, i= hydraulic gradient
dh= change in hydraulic head between upgradient and downgradient locations
dl= horizontal distance between upgradient and downgradient locations, parallel to flow (perpendicular to potentiometric contours)

Summary Table - Hydraulic Gradient

Date	Vector	Upgradient WL elevation (ft MSL)	Downgradient WL Elevation (ft MSL)	dh (ft)	dl (ft)	i (ft/ft)	Average i (ft/ft)
April 3, 2018	Vector 1 (32B)	4509.36	4470	39.36	4875	0.0081	
	Vector 2 (39B)	4500.00	4486.26	13.74	1875	0.0073	
	Vector 3 (48B)	4488.84	4468.39	20.45	2400	0.0085	0.0080
June 26, 2018	Vector 1 (32B)	4509.97	4475	34.97	4500	0.0078	
	Vector 2 (39B)	4500.00	4486.90	13.10	1725	0.0076	
	Vector 3 (48B)	4489.51	4468.81	20.70	2400	0.0086	0.0080
October 24, 2018	Vector 1 (32B)	4510.34	4470	40.34	4950	0.0081	
	Vector 2 (39B)	4500.00	4486.98	13.02	1725	0.0075	
	Vector 3 (48B)	4489.67	4468.70	20.97	2400	0.0087	0.0081
						Minimum	0.0080
						Maximum	0.0081
						Average	0.0080

Hydraulic Conductivity (K, ft/d)

K from slug and pumping tests conducted at site		
Minimum	0.50	ft/day
Maximum	6.16	ft/day
Average (geomean)	1.54	ft/day

Specific Yield, Effective Porosity

Specific Yield, Effective Porosity		
Minimum	0.02	
Maximum	0.3	
Average	0.15	

Note: Effective porosity/specific yield is based on literature values from Arikaree Formation literature and textbook values for sandstone

Seepage Velocity

$$v_s = {-K * i}/{n_e}$$

where, v_s= seepage velocity, feet per day (ft/d)
K= hydraulic conductivity, feet per day (ft/d)
i= hydraulic gradient, feet per foot (ft/ft)
n_e= effective porosity/specific yield, unitless

Calculated Seepage Velocities (ft/day)				
	K (ft/day)	i (ft/ft)	n_e	v_s (ft/day)
Minimum	0.50	0.0080	0.30	0.013
Maximum	6.16	0.0081	0.02	2.508
Average	1.54	0.0080	0.15	1.261

Groundwater Velocity Calculations
Laramie River Station
CCR Unit/Multi-Unit

Project:	Laramie River Station	CCR Unit:	Emergency Holding Ponds	Background Wells:	MW-41B, MW-42B, MW-43B
Calculations by:	Jeremy Hurshman/Chris Ahrendt	Checked by:	Gregg Somermeyer	Downgradient Wells:	MW-44B, MW-45B, MW-46B, MW-47B
Date:	1/10/2018	Date:	1/21/2019		

Hydraulic Gradient (i, ft/ft)

Governing Equation:
(Hydrualic Gradient)

$$i = -{}^{dh}/_{dl}$$

where, i= hydraulic gradient
dh= change in hydraulic head between upgradient and downgradient locations
dl= horizontal distance between upgradient and downgradient locations, parallel to flow (perpendicular to potentiometric contours)

Calculation Table

Date	Vector	Upgradient WL elevation (ft MSL)	Downgradient WL Elevation (ft MSL)	dh (ft)	dl (ft)	i (ft/ft)	Average i (ft/ft)
April 3, 2018	Vector 1 (42B)	4469.27	4455.00	14.27	1200	0.0119	0.0143
	Vector 2 (43B)	4468.87	4450.00	18.87	1125	0.0168	
June 26, 2018	Vector 1 (42B)	4470.56	4455.00	15.56	975	0.0160	0.0212
	Vector 2 (43B)	4473.75	4450.00	23.75	900	0.0264	
October 24, 2018	Vector 1 (42B)	4474.48	4455.00	19.48	825	0.0236	0.0239
	Vector 2 (43B)	4471.72	4450.00	21.72	900	0.0241	
						Minimum	0.0143
						Maximum	0.0239
						Average	0.0198

Hydraulic Conductivity (K, ft/d)

K from slug and pumping tests conducted at site		
Minimum	0.75	ft/day
Maximum	3.12	ft/day
Average (geomean)	1.31	ft/day

Specific Yield, Effective Porosity

Specific Yield, Effective Porosity		
Minimum	0.02	
Maximum	0.3	
Average	0.15	

Note: Effective porosity/specific yield is based on literature values from Arikaree Formation literature and textbook values for sandstone

Seepage Velocity

$$v_s = {}^{-K * i}/_{n_e}$$

where, v_s= seepage velocity, feet per day (ft/d)
K= hydraulic conductivity, feet per day (ft/d)
i= hydraulic gradient, feet per foot (ft/ft)
n_e= effective porosity/specific yield, unitless

Calculated Seepage Velocities (ft/day)				
	K (ft/day)	i (ft/ft)	n_e	v_s (ft/day)
Minimum	0.75	0.0143	0.30	0.036
Maximum	3.12	0.0239	0.02	3.724
Average	1.31	0.0198	0.15	1.880

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